

# Anatomy of UL- Shoulder girdle

By DR/Aliaa omar El hady

## Anatomy of UL- Shoulder girdle (1)

-----

- The shoulder girdle or pectoral girdle is the set of bones which connects the upper limb to the axial skeleton on each side.
- It consists of the clavicle, scapula, and coracoid.
- The shoulder girdle is a complex of five joints. Three of these joints are true anatomical joints while two are physiological ("false") joints.

### 1- Glenohumeral joint:

-----

- Is the articulation between the head of the humerus and the glenoid cavity of the scapula.
- It is a ball and socket type of synovial joint with three rotatory and three translatory degree of freedom.
- It allows for adduction, abduction, medial and lateral rotation, flexion and extension of the arm.

### 2- Acromioclavicular joint

-----

- Is the articulation between the acromion process of the scapula and the lateral end of the clavicle.
- It is a plane type of synovial joint.
- The acromion of the scapula rotates on the acromial end of the clavicle.

### 3-Sternoclavicular joint

-----

- Is the articulation of the manubrium of the sternum and the first costal cartilage with the medial end of the clavicle.
- It is a saddle type of synovial joint but functions as a plane joint.

-The sternoclavicular joint accommodates a wide range of scapula movements and can be raised to a 60° angle.

#### 4-Scapulocostal joint (Scapulothoracic joint):

-----

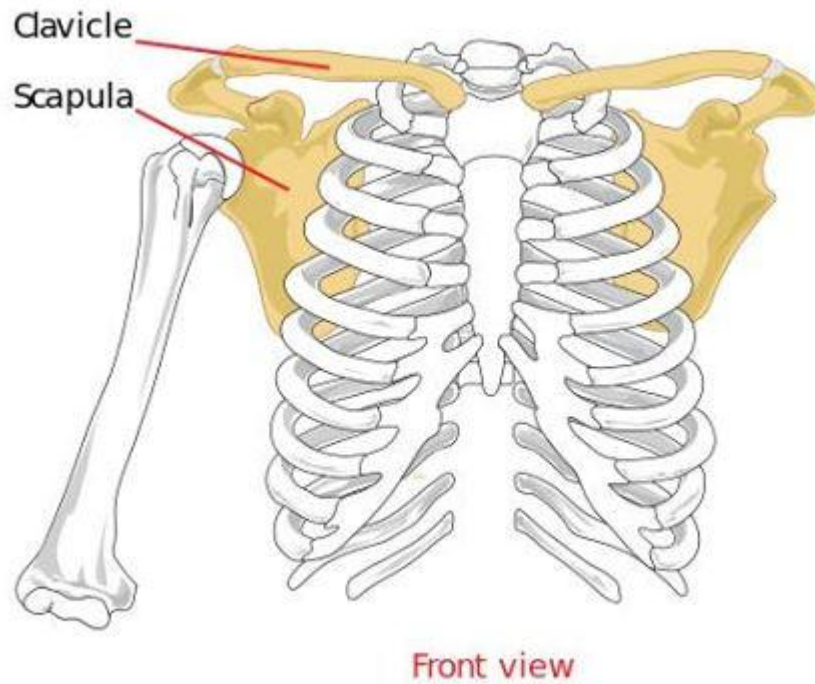
- Is a physiological joint formed by an articulation of the anterior scapula and the posterior thoracic rib cage.
- It is musculotendinous in nature and is formed predominantly by the trapezius, rhomboids and serratus anterior muscles.
- The pectoralis minor also plays a role in its movements.
- The gliding movements at the scapulocostal joint are elevation, depression, retraction, protraction and superior and inferior rotation of the scapula.
- Disorders of the scapulocostal joint are not very common and usually restricted to snapping scapula.

#### 5- Suprahumeral joint (Subacromial joint):

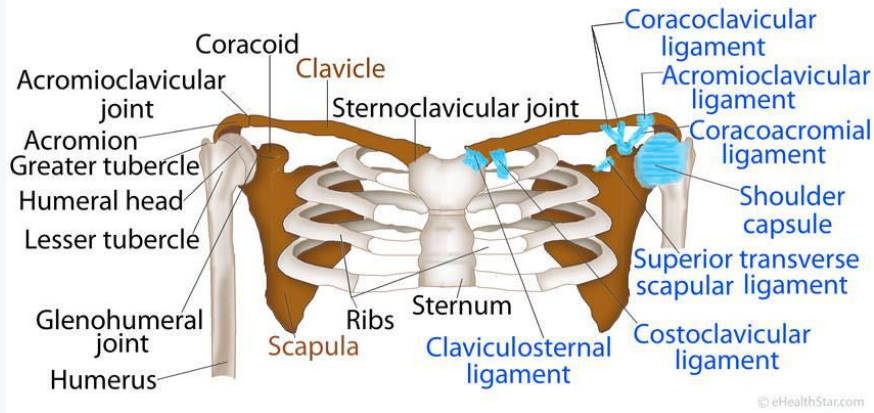
-----

- Is a physiological joint formed by an articulation of the coracoacromial ligament and the head of the humerus.
- It is formed by the gap between the humerus and the acromion process of the scapula.
- This space is filled mostly by the subacromial bursa and the tendon of supraspinatus.
- This joint plays a role during complex movements while the arm is fully flexed at the glenohumeral joint, such as changing a lightbulb, or painting a ceiling.

وحنشرح بالتفصيل ان شاء الله



## Pectoral (Shoulder) Girdle



### Anatomy of UL- Shoulder girdle (2)

#### 1- STERNOCLAVICULAR JOINT الصور موضحة لكل جزئية بالترتيب

طبعا المفاصل الصغيرة دي محدش بيديها اعتبار وبيطنشوها ... ممكن الخلل في المفاصل دي تكون هي سبب شكوى المريض الاساسية ومسمعة في باقى الذراع .... ومادام مش عارفها يبقى مش حتشخصها ..... وكمان علشان بتطنشها بيصطادك فيها في الامتحان

ونخلى بالننا ان ده مفصل رئيسى من المفاصل اللى بيأثر عليها الروماتويد ولازم نعرف نكشف عليه ازاي

- Is a synovial sellar joint ( saddle joint that acts as ball & socket joint) هام جدا

- The only skeletal articulation between the upper limb and the axial skeleton.

Articulating surfaces:

-----  
- the sternal end of the clavicle and the clavicular notch of the sternum, together with the adjacent superior surface of the first costal cartilage.

-The larger clavicular articular surface is covered by fibrocartilage.

-The joint is convex vertically but slightly concave anteroposteriorly ز

- An articular disc completely divides the joint.

Fibrous capsule:

-----  
- The capsule is thickened in front and behind, but above, and especially below, it is little more than loose areolar tissue.

Ligaments: اربعة ... مهمين جدا .... احفظوا اساميهم ومن الاسم حتعرفوا هما موصلين ايه بايه

-----  
- The ligaments are the anterior and posterior sternoclavicular and the costoclavicular on each side, and the midline interclavicular.

1- Anterior sternoclavicular ligament:

-----  
- It is broad

- attached above to the anterosuperior aspect of the sternal end of the clavicle.

- It passes inferomedially to the upper anterior aspect of the manubrium, spreading onto the first costal cartilage.

## 2- Posterior sternoclavicular ligament

-----

- Is a weaker band posterior to the joint.
- It descends inferomedially from the back of the sternal end of the clavicle to the back of the upper manubrium.

## 3- Interclavicular ligament:

-----

- Is continuous above with deep cervical fascia
- It unites the superior aspect of the sternal ends of both clavicles; some fibres are attached to the superior manubrial margin.

## 4- Costoclavicular ligament

-----

- Is like an inverted cone, but short and flattened.
- It has anterior and posterior laminae which are attached to the upper surface of the first rib and costal cartilage.
- It ascends to the margins of an impression on the inferior clavicular surface at its medial end.
- Fibres of the anterior lamina ascend laterally and those of the posterior lamina (which are shorter) ascend medially ; they fuse laterally and merge medially with the capsule.

Articular disc: هام جدا

-----

- The articular disc is flat and almost circular
- between the sternal and clavicular surfaces.
- It is attached :
  - \*\*above to the posterosuperior border of articular surface of clavicle,
  - \*\*below to the first costal cartilage near its sternal junction,
  - \*\*and by the rest of its circumference to the capsule.
- It is thicker peripherally, especially in its superoposterior part and a smaller inferomedial one.

الجزئية دى هامة جدا لفهم الكينزيولوجى ... ركزوا عليها

- The capsule around the sternal part is more lax: movements between the clavicle and the disc are more extensive than those between the disc and sternum.

- The sellar shape of the articular surfaces permits movement in approximately anteroposterior and vertical planes, and some rotation about the long axis of the clavicle.

- Close-packing probably coincides with maximum posterior rotation associated with full scapular rotation. Some anteroposterior translation also occurs.

Vascular supply:

-----

The sternoclavicular joint is supplied by branches from the internal thoracic and suprascapular arteries.

**Innervation:**

-----

The sternoclavicular joint is innervated by branches from the medial supraclavicular nerve and the nerve to subclavius.

**Factors maintaining stability :** هاهنا عوامل كثيرة جداً

-----

- There is relatively little bony articular congruence at the sternoclavicular joint.

-However, the strength of its associated ligaments, and especially its articular disc, actually make it very stable.

-These factors, and the usual transmission of forces along the clavicle, make dislocation rare: fracture along the clavicular shaft is far more common.



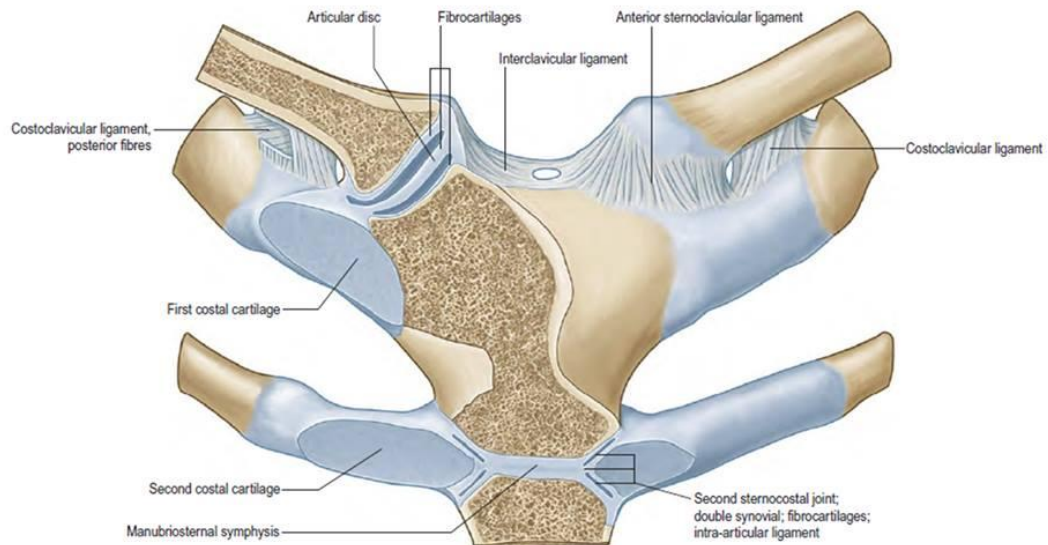
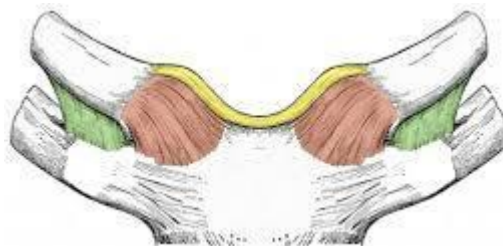


Fig. 46.12 Sternoclavicular joints: anterior aspect; left joint intact and right in coronal section.

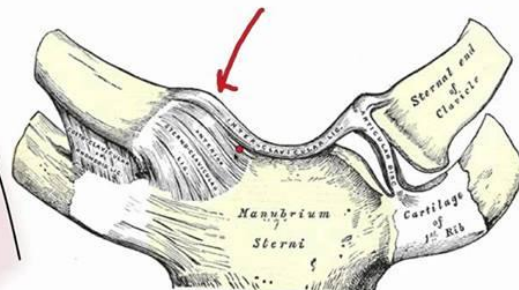
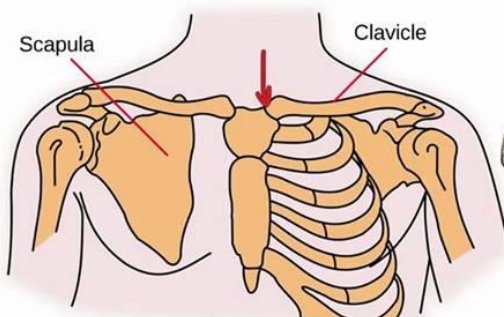


- Interclavicular lig.
- Anterior sternoclavicular lig.
- Costoclavicular lig.

© TeachMeAnatomy

## The Sternoclavicular Joint

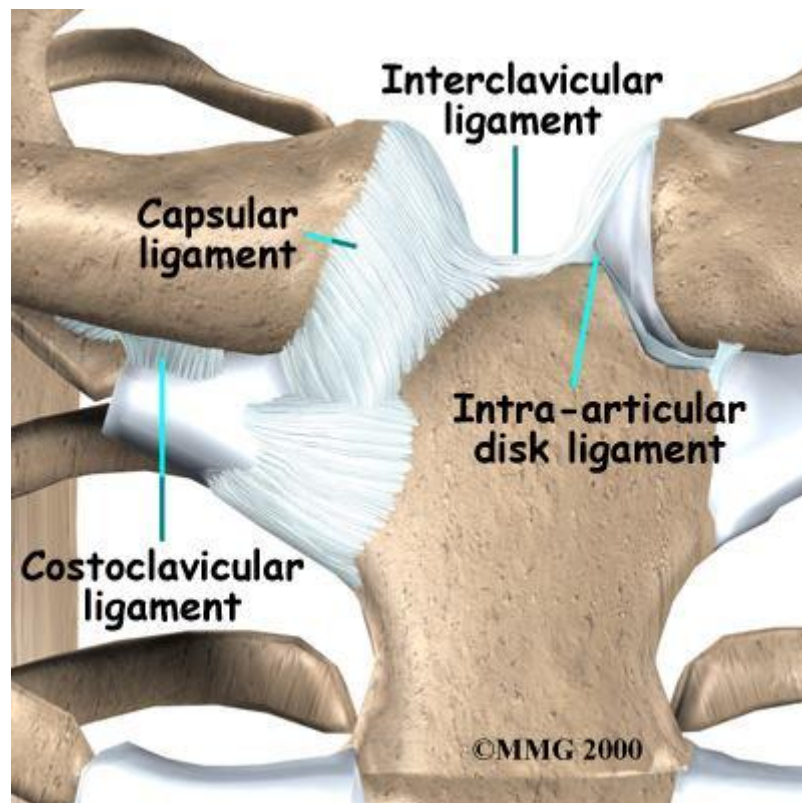
Where the Clavicle articulates with the manubrium of the sternum

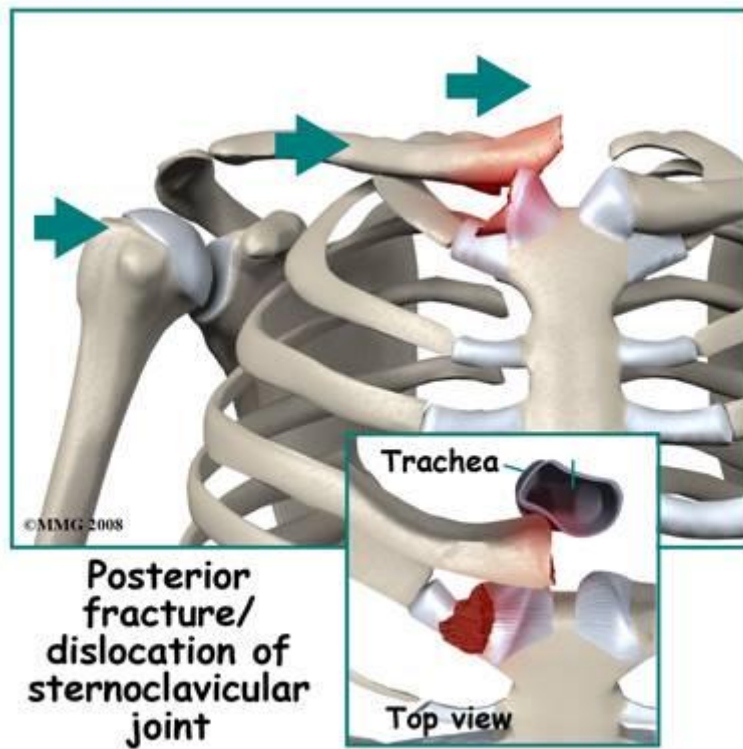
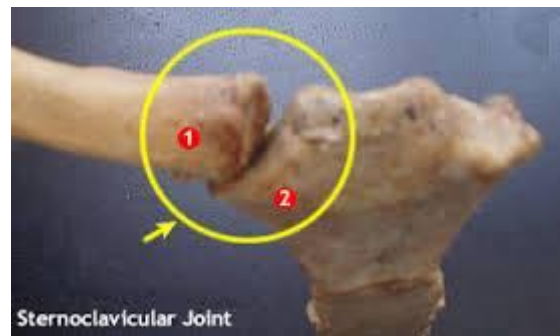


**INTERACTIVE-BIOLOGY.COM**

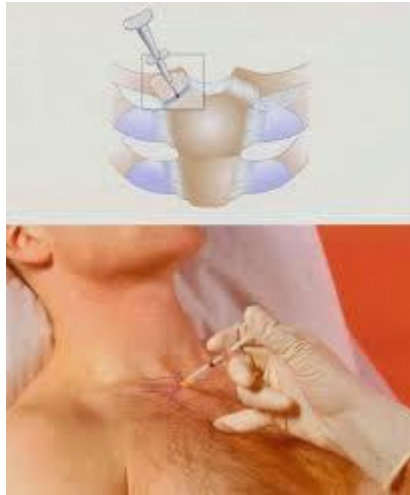












**هااااااااااااااااااام جدا ... انظروا** 2- ACROMIOCLAVICULAR JOINT  
الصور الموضحة

Articulating surfaces:

The articulating surfaces are between the acromial end of the clavicle and the medial acromial margin.

The clavicular surface is a narrow, oval area which faces inferolaterally and overlaps a corresponding facet on the medial acromial border.

The long axis is anteroposterior.

## Fibrous capsule

The capsule completely surrounds the articular margins and is strengthened above by the acromioclavicular ligament.

هـــا

The capsule is lined by synovial membrane.

## Ligaments:

-----

The acromio- and coraco-clavicular ligaments run between the clavicle and the acromion and coracoid processes respectively.

### 1- Acromioclavicular ligament

=====

- The acromioclavicular ligament is quadrilateral.
- It extends between the upper aspects of the lateral end of the clavicle and the adjoining acromion.
- Its parallel fibres interlace with the aponeuroses of trapezius and deltoid.

### 2- Coracoclavicular ligament لها جزئيتين هامين جدا

-----

- The coracoclavicular ligament connects the clavicle and the coracoid process of the scapula.
- Though separate from the acromioclavicular joint, it is a most efficient accessory ligament, and maintains the apposition of the clavicle to the acromion. هاهنا

The trapezoid and conoid parts of the ligament, usually separated by fat or, frequently, by a bursa, connect the medial horizontal part of the coracoid process and lateral end of the subclavian groove of the clavicle; these adjacent areas may even be covered by cartilage to form a coracoclavicular joint.

#### The trapezoid part

-----

- is anterolateral and is broad, thin and quadrilateral,
- ascending slightly from the upper coracoid surface to the trapezoid line on the inferior clavicular surface.
- It is almost horizontal,
- its anterior border is free, and its posterior border is joined to the conoid part, forming an angle which projects backwards.

#### The conoid part

-----



- is posteromedial and is a dense, almost vertical triangular band.
- Its base is attached to the conoid tubercle of the clavicle and its inferior apex is attached posteromedially to the root of the coracoid process in front of the scapular notch.

Articular disc:

-----

- The articular disc often occurs in the upper part of the joint, partially separating the articular surfaces: occasionally it completely divides the joint.

Vascular supply

-----

The acromioclavicular joint receives its arterial supply from branches from the suprascapular and thoracoacromial arteries.

Innervation :

-----

The acromioclavicular joint is innervated by branches from the suprascapular and lateral pectoral nerves.

Factors maintaining stability

-----

- The coracoclavicular ligament stabilizes the acromioclavicular joint.
- In acromioclavicular dislocation, the ligament is torn and the scapula falls away from the clavicle, which may be slightly elevated by the unopposed pull of trapezius.
- Dislocation can occur because of the flatness and orientation of the joint surfaces; once the acromioclavicular joint dislocates it never reduces.

Movements:

-----

- Movements at the joint are like those of the sternoclavicular joint.
- These are passive, i.e. no muscle directly moves the joint, but muscles which move the scapula indirectly move the clavicle.
- Axial rotation of the clavicle is about 30°, the two joints

together therefore,  
permit about  $60^\circ$  of scapular rotation.  
-Angulation with the scapula occurs in any direction.

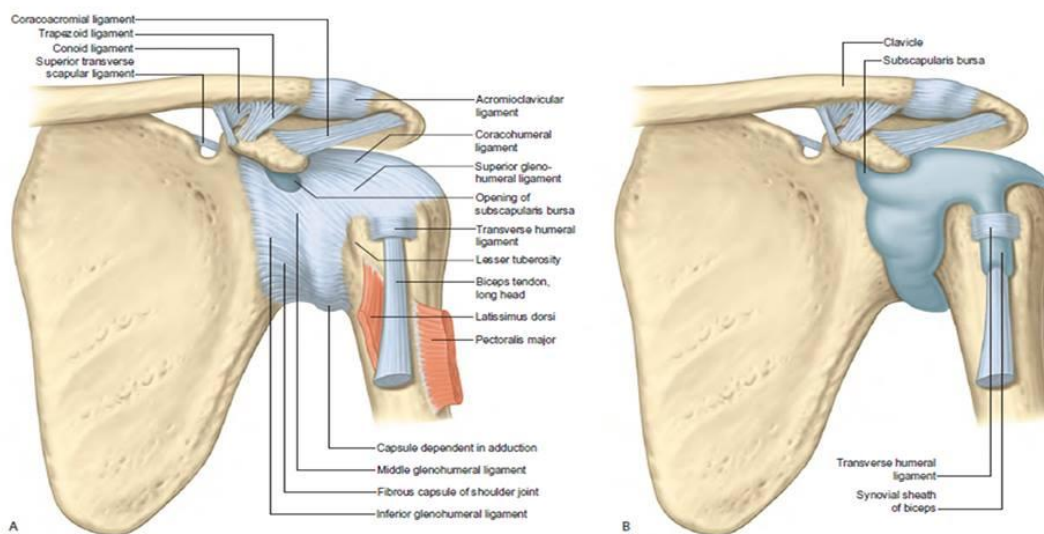
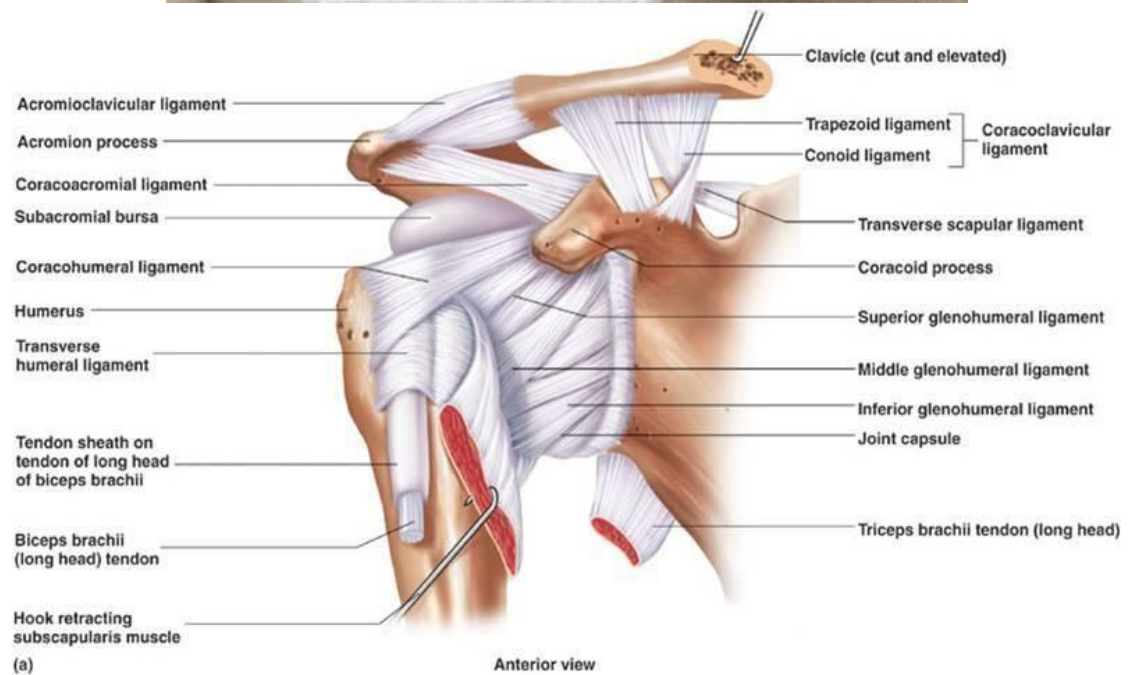
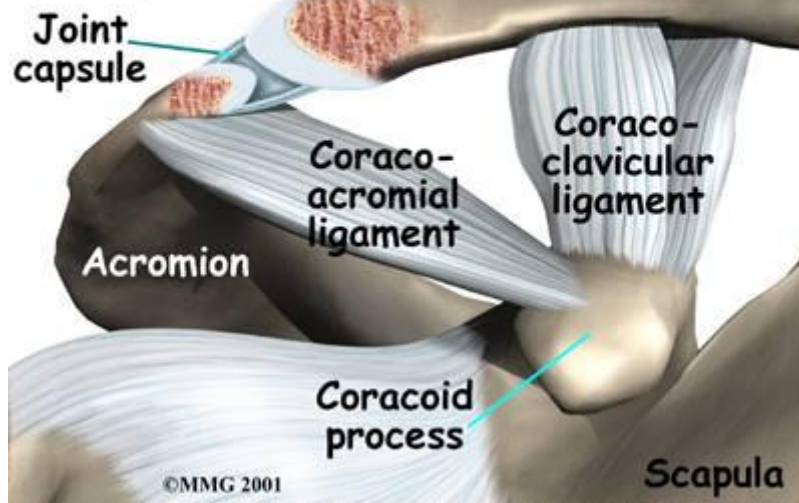


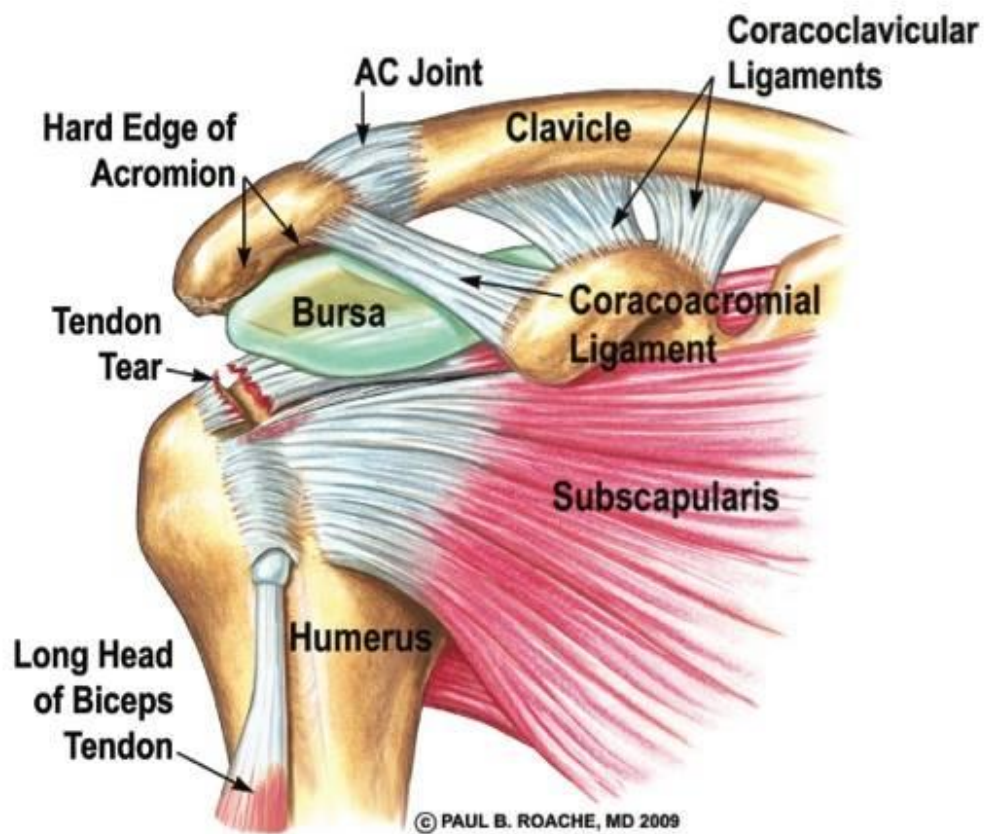
Fig. 46.14 A, The anterior aspect of the left shoulder. B, A deeper view of the anterior aspect than in (A), showing the subscapularis bursa.

Normal Acromioclavicular joint

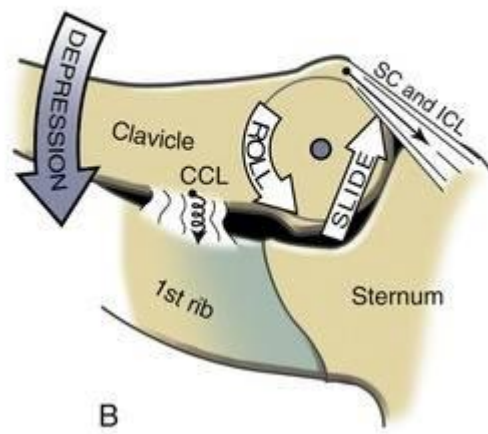
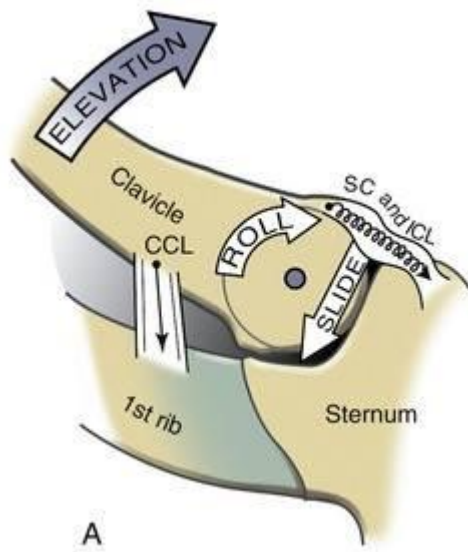
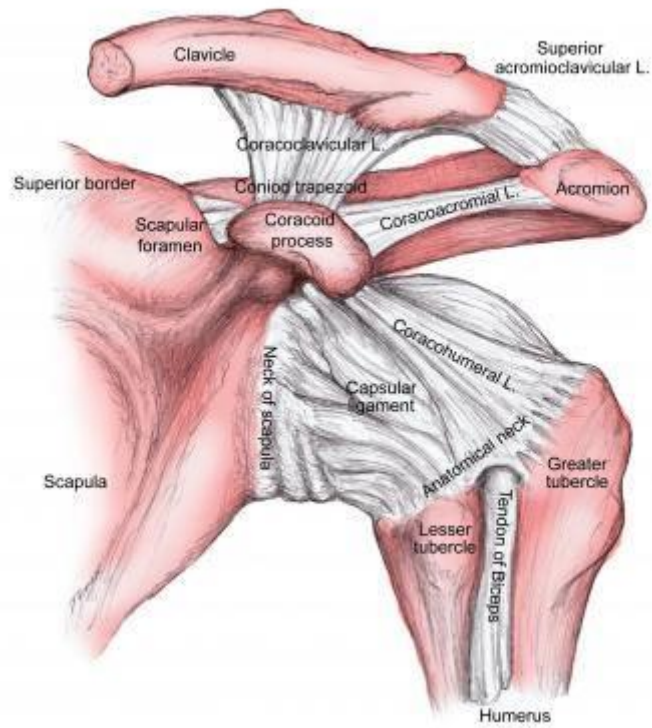


Cross Section, Acromioclavicular Joint

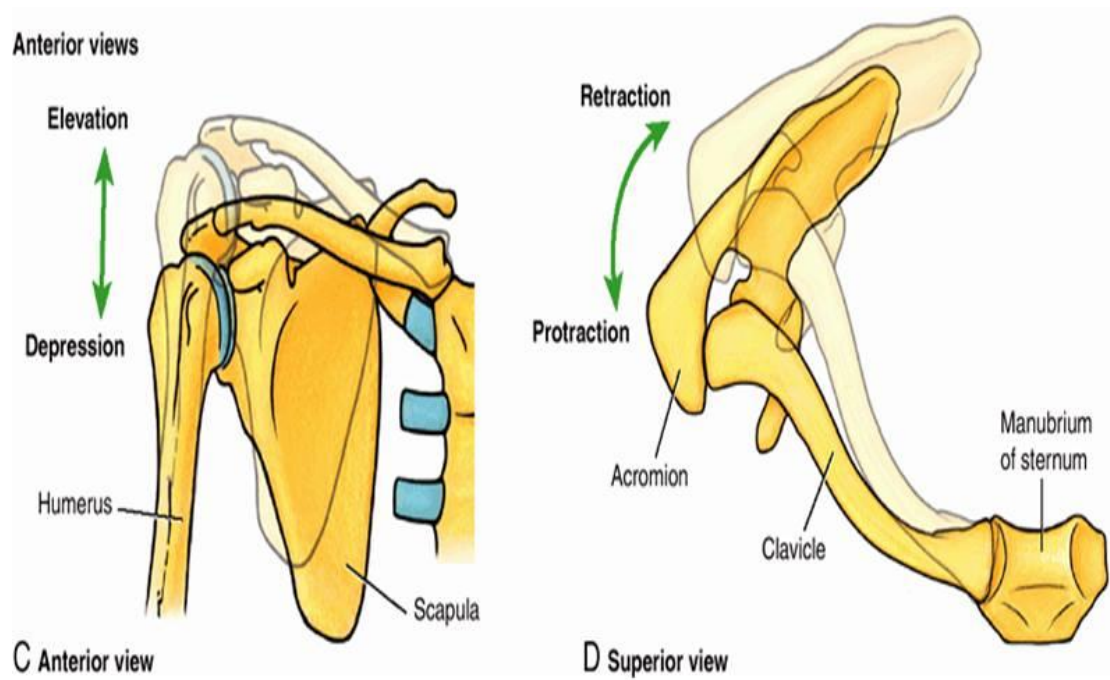




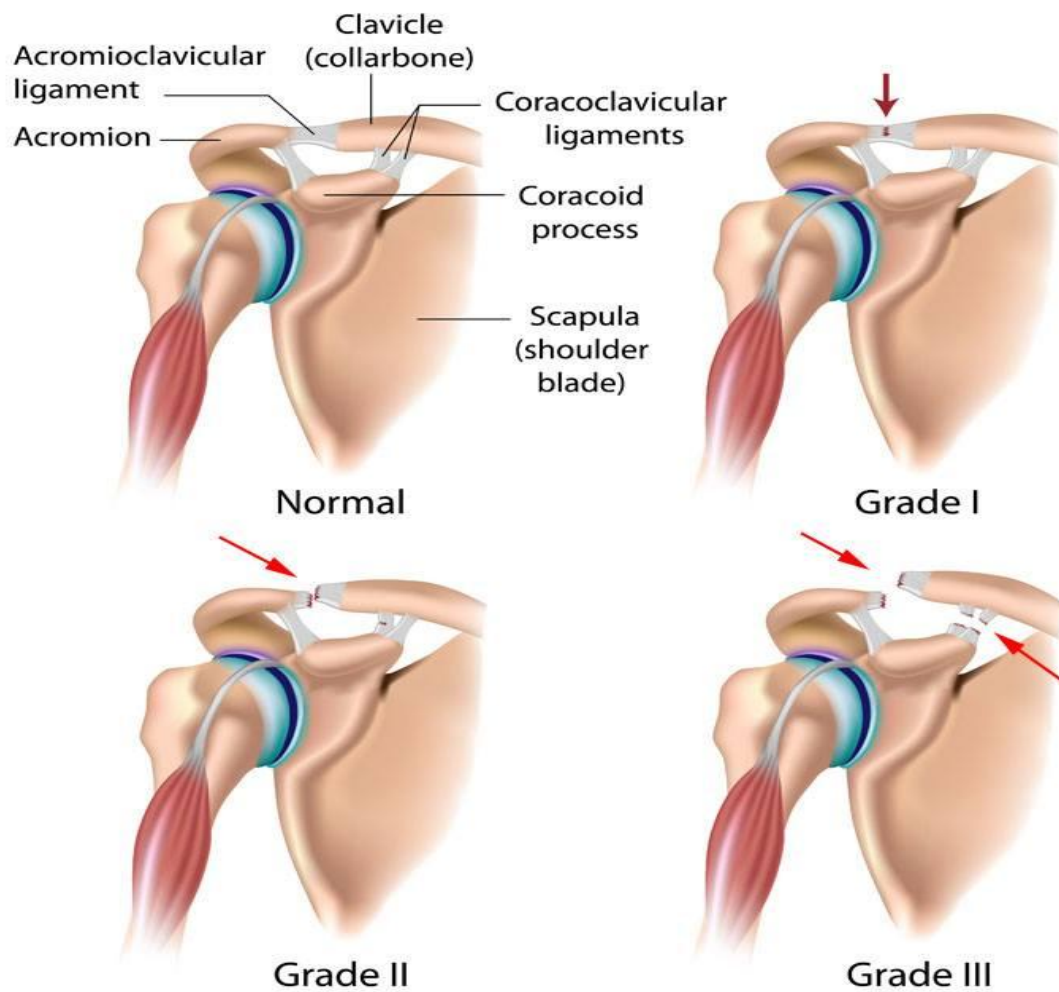




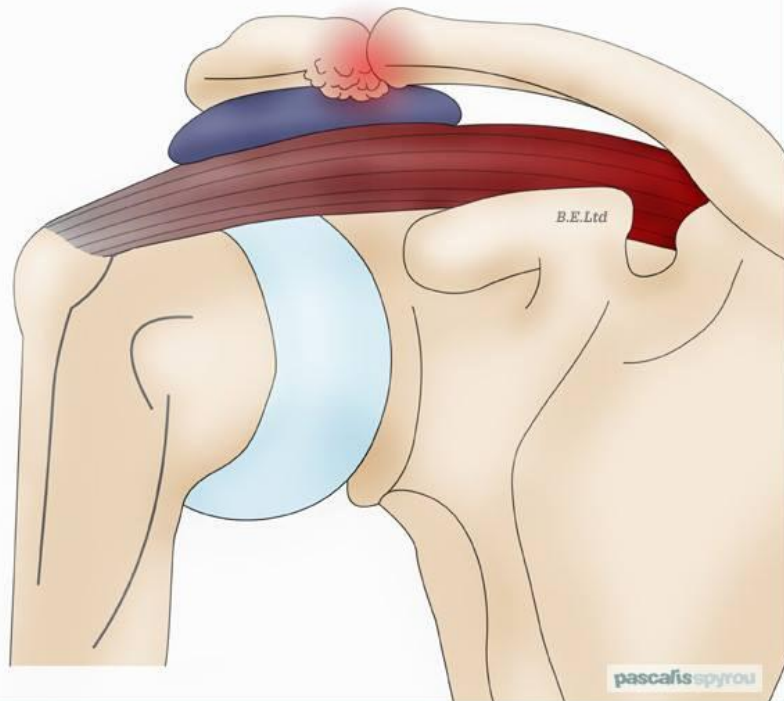




## ***AC Joint Sprain / AC Joint Separation***



## Acromioclavicular arthritis / Arthrosis



[www.clinicalexams.co.uk](http://www.clinicalexams.co.uk)



## Anatomy of UL- Shoulder girdle (4)

---

### MOVEMENTS OF THE PECTORAL (SHOULDER) GIRDLE

هام جدا (1)

---

- Clavicular movements at the sternoclavicular and acromioclavicular joints are inevitably associated with movements of the scapula, and these are usually accompanied by movements of the humerus.
- The acromioclavicular joint allows anteroposterior gliding and rotation of the acromion, and hence the scapula, on the clavicle: scapular range is increased by movements at the sternoclavicular joint.
- The sternoclavicular and the acromioclavicular joints, in combination with the fascial space between the scapula and underlying chest wall, are collectively known as the scapulothoracic articulation.
- Scapular movements on the thoracic wall are facilitated by areolar tissue between subscapularis, serratus anterior and the chest wall.
- With the arm by the side, the normal posture of the shoulder girdle relative to the trunk involves moderate activity in trapezius and serratus anterior, and this increases when the limb is loaded.
- The following account should be read together with the description of movements of the glenohumeral joint.

(1) -Elevation and depression

---

-Scapular elevation and depression, as in ‘shrugging the shoulders’, do not necessarily imply movement at the shoulder joint.

In elevation:

-----

-slight angulation or swing occurs at the acromioclavicular joint.

-The sternal end of the clavicle, rotating about an anteroposterior axis through the bone above the medial attachment of the costoclavicular ligament, slides down over the articular disc (translation).

-This is checked by antagonist muscles and tension in the costoclavicular ligament and lower capsule.

-It is produced by the upper part of trapezius and levator scapulae, and since these tend to rotate the scapula in opposite directions, pure elevation can occur.

In depression:

-----

-slight angulation occurs at the acromioclavicular joint, and the clavicle slides up on the disc at the sternoclavicular joint.

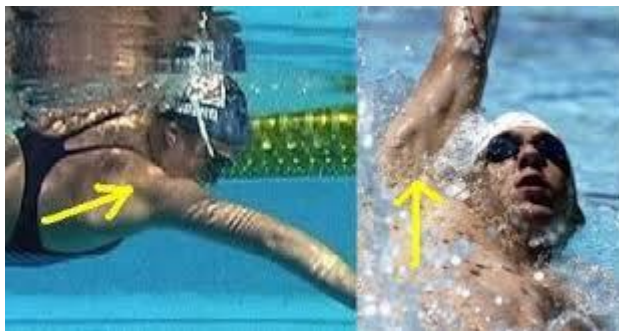
-The movements are checked by antagonist muscles, the interclavicular and sternoclavicular ligaments and the articular disc.

-Usually gravity alone is sufficient: when necessary, the lowest part of serratus anterior and pectoralis minor are active depressors.

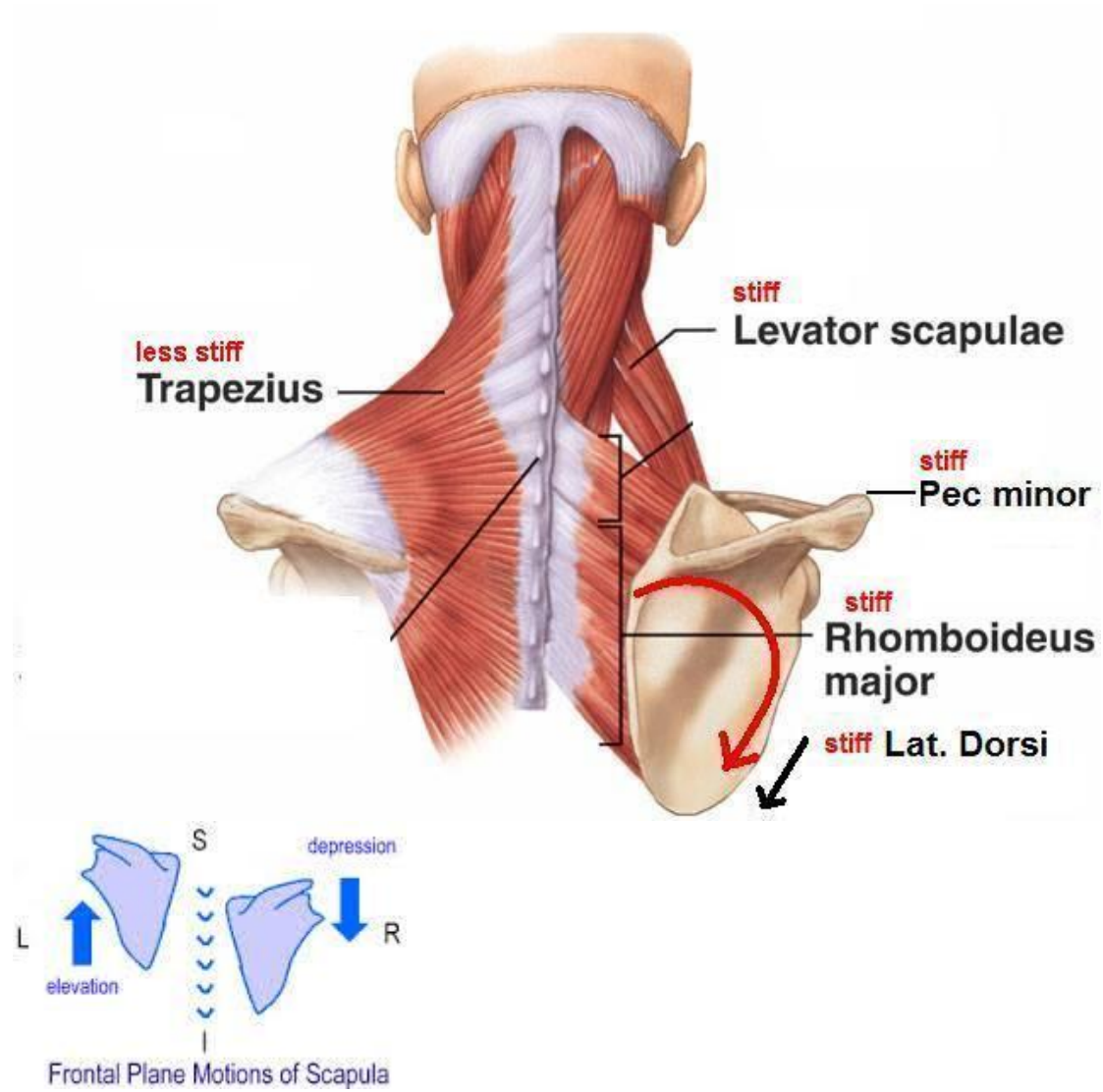
**Elevation**



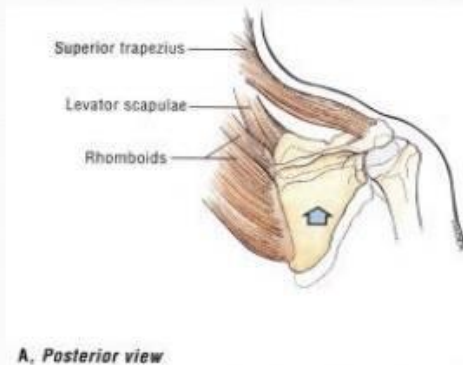
**Depression**





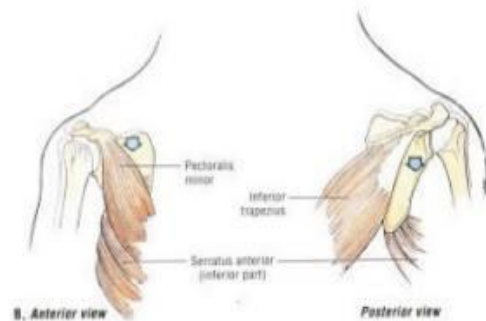


# Scapula Elevation and Depression



A. Posterior view

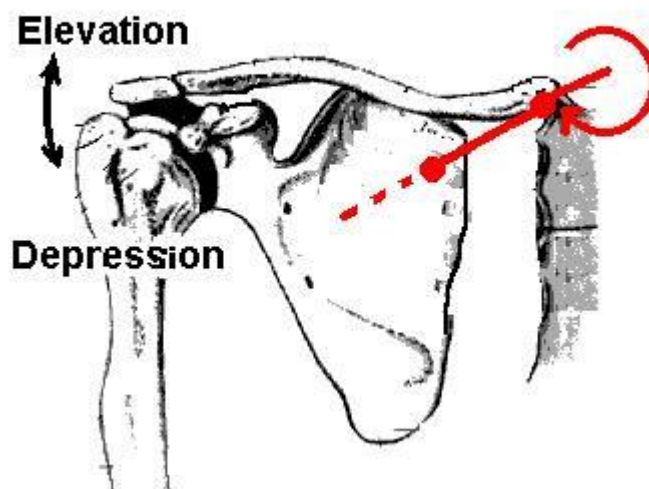
Superior trapezius  
Levator scapulae  
Rhomboids



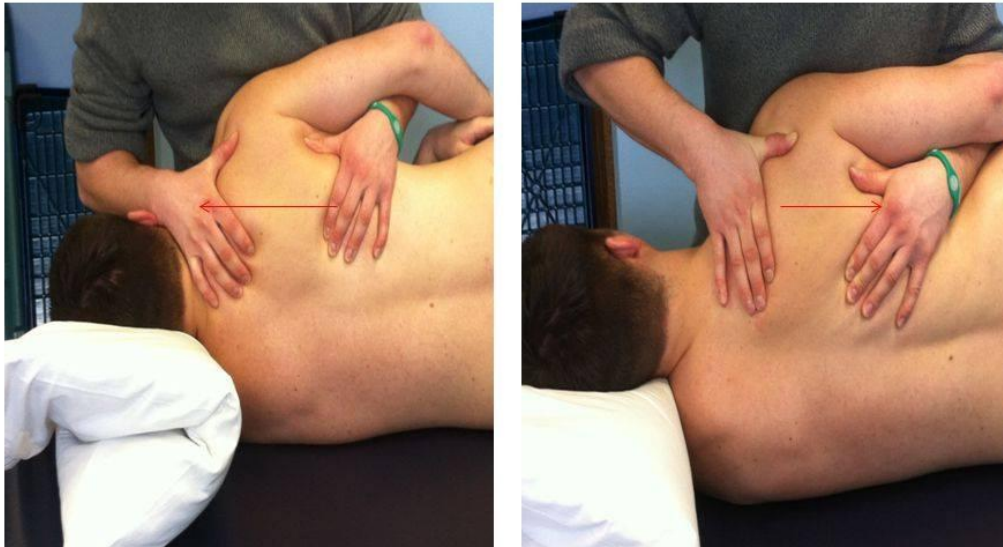
B. Anterior view

Posterior view

Pectoralis minor  
Inferior trapezius  
Serratus anterior  
Ant part



# Scapular Elevation-Depression



Anatomy of UL- Shoulder girdle (5)

---

## MOVEMENTS OF THE PECTORAL (SHOULDER) GIRDLE

(2) هام جدا

---

-----  
(2)- Protraction and retraction

=====

Protraction (forward movement)

---

-round the thoracic wall occurs in pushing, thrusting and reaching movements, usually with some lateral rotation.

-The acromion advances over the clavicular facet to the limit, and the shoulder is simultaneously advanced by forward movement of the lateral end of the clavicle and posterior translation of its sternal end over the sternal facet, carrying the disc with it.

-Antagonist muscles, together with the anterior sternoclavicular ligament and posterior lamina of the costoclavicular ligament, check backward slide of the sternal end.

-Serratus anterior and pectoralis minor are prime movers and maintain continuous apposition of the scapula, especially its medial border, in smooth gliding on the thoracic wall.

-The upper part of latissimus dorsi also acts like a strap across the inferior scapular angle in protraction and lateral rotation.

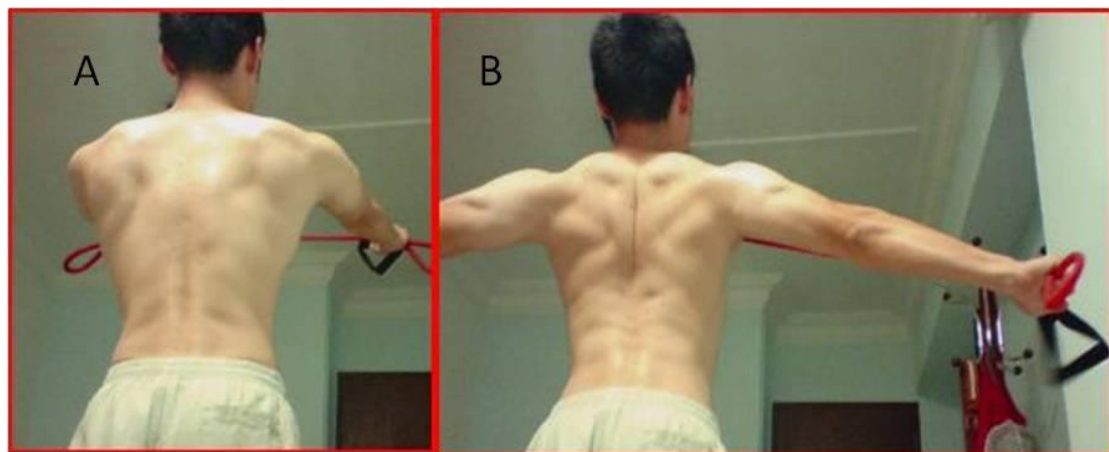
In scapular retraction, i.e. bracing back the shoulders,

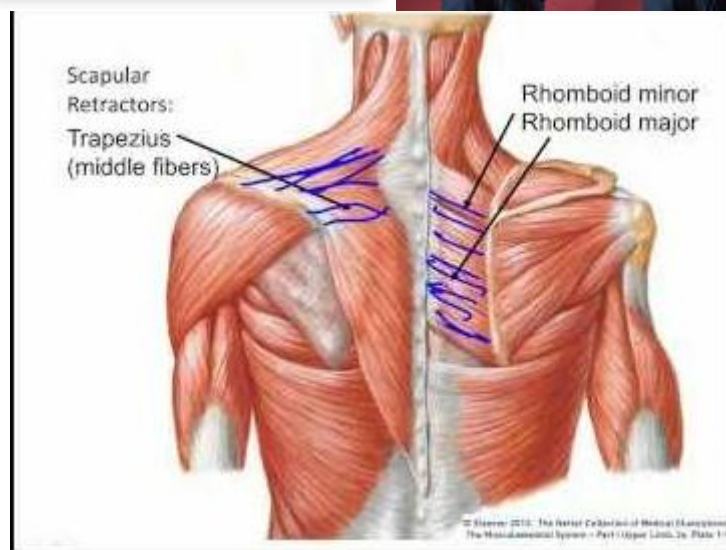
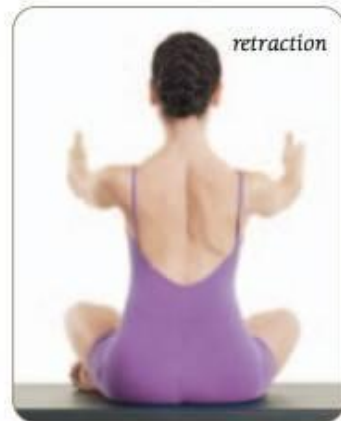
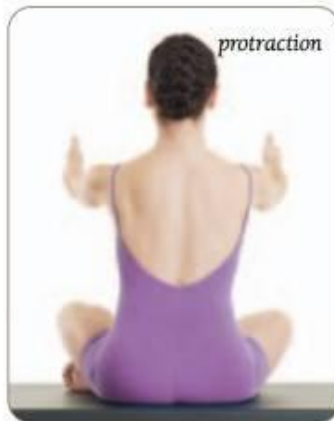
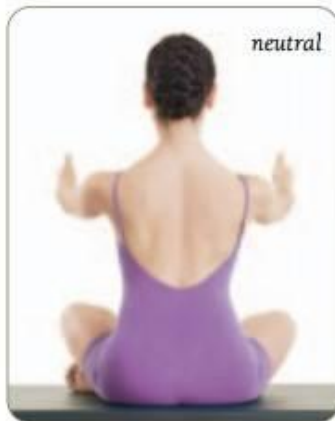
-----  
- these movements are reversed and checked at the sternoclavicular joint by the posterior sternoclavicular ligament and anterior lamina of the costoclavicular ligament.

-Trapezius and the rhomboids are prime movers, but gravity may also produce retraction when the weight of the trunk is taken by the arms in leaning forwards, which is to a degree controlled by protractive musculature.

-When force is applied at the end of an outstretched arm, e.g. in a fall on the hand, pressure transmitted to the glenoid fossa tends to drive the sloping acromial facet below the acromial end of the clavicle.

-It also tenses the trapezoid ligament, which resists the displacement.

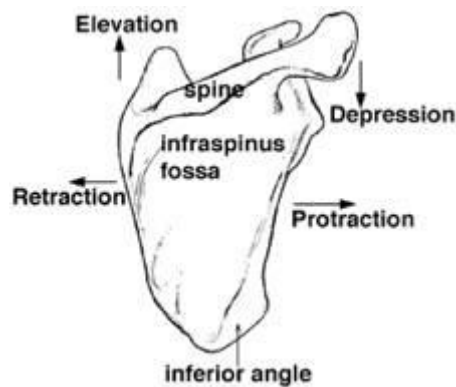
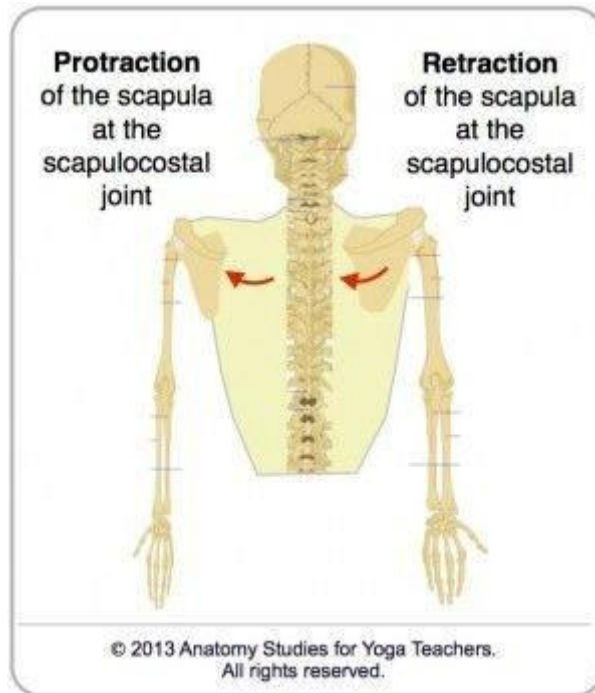




### Scapular Protraction - Retraction







## Anatomy of UL- Shoulder girdle (6)

### MOVEMENTS OF THE PECTORAL (SHOULDER) GIRDLE

(3) هام جدا

(3)-Lateral and medial rotation:

Lateral (upward) rotation of the scapula:

-increases the range of humeral elevation by turning the glenoid cavity to face almost directly up, e.g.raising an arm above the head.

-This movement is always associated with some humeral elevation and with protraction of the scapula.

-Scapular rotation requires movement at both sternoclavicular and acromioclavicular joints

-the sternoclavicular joint permits elevation of the lateral end of the clavicle, a movement which is almost complete when the arm is abducted to 90°.

-The acromioclavicular joint moves in the first 30° of abduction, when the conoid ligament becomes taut, and is subsequently accompanied by clavicular rotation at the sternoclavicular joint around the longitudinal axis of the bone.

-The medial end is depressed further as the lateral end continues to rise.

- Some acromioclavicular movement also occurs in the final stages of humeral abduction.

-Trapezius (upper part) and serratus anterior (lower part) are prime movers.

Medial (downward) rotation

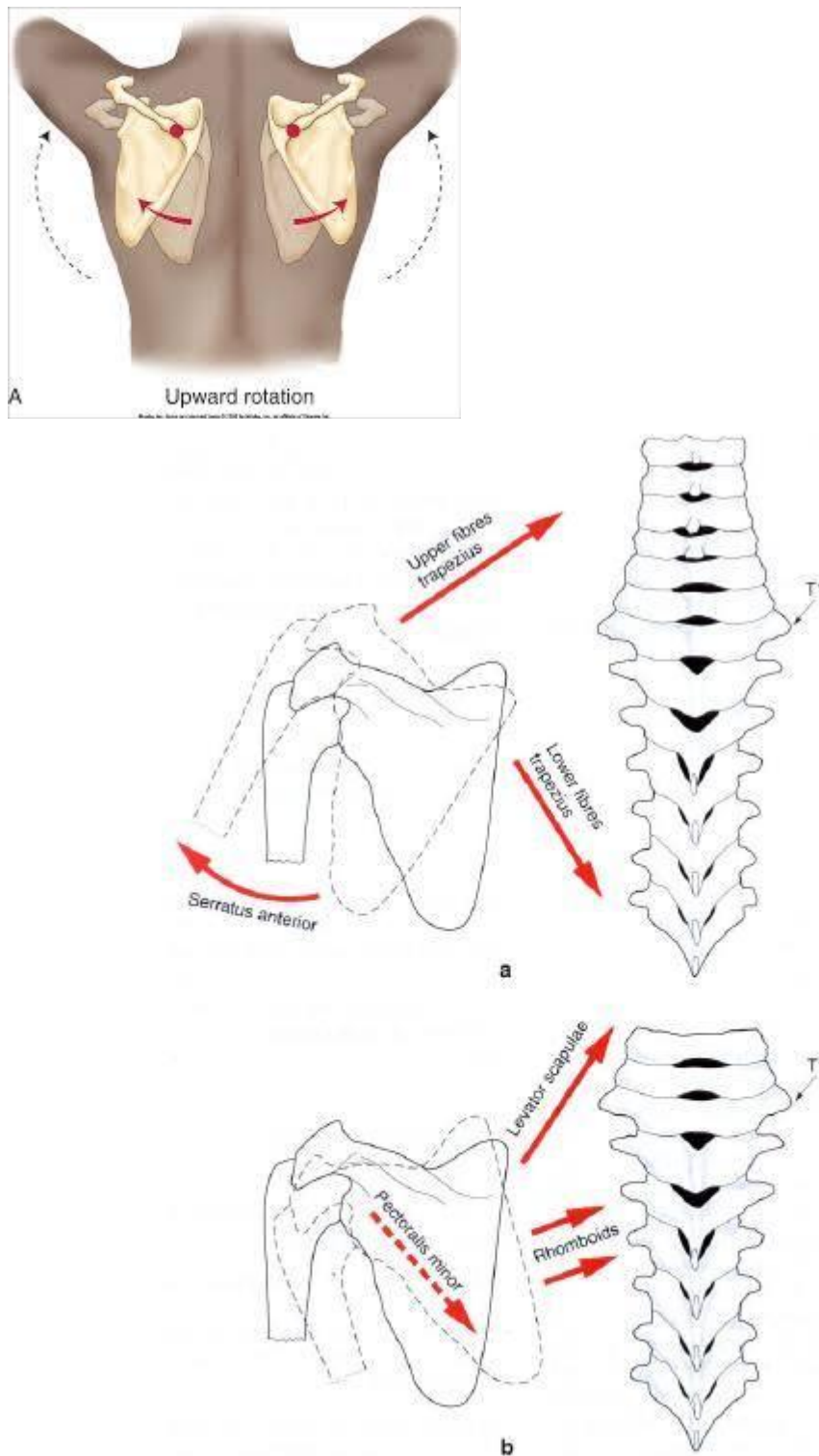
-----  
- is usually effected by gravity: gradual active lengthening of trapezius and serratus anterior is sufficient to control it.

-When more force is needed, levator scapulae, the rhomboids and, in the initial stages, pectoralis minor, are prime movers in returning the scapula to a position of rest.

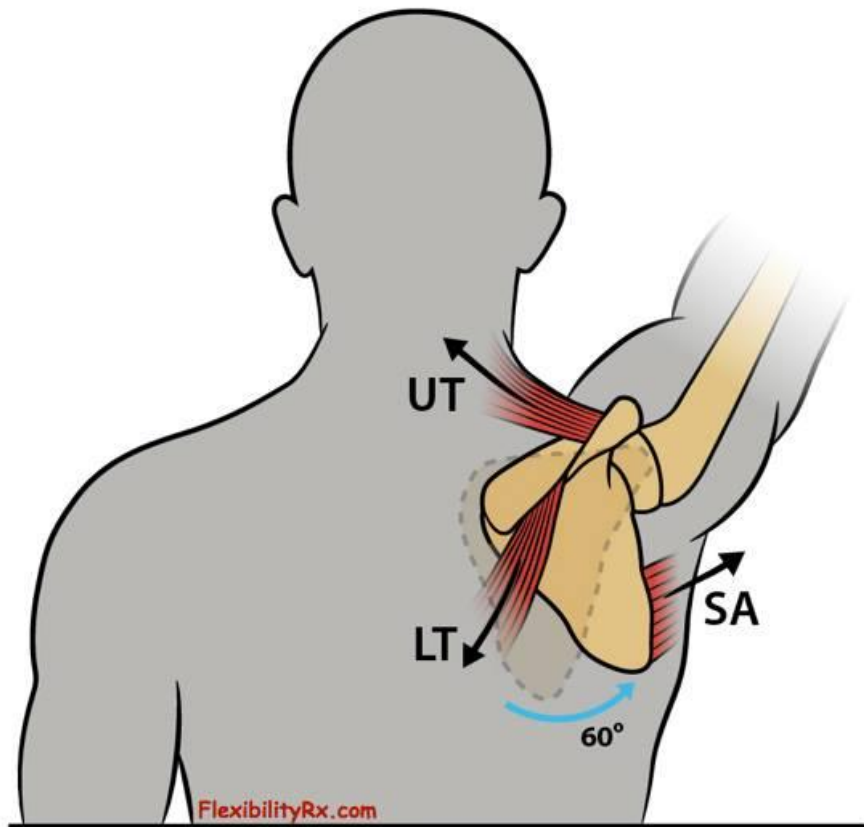
-Muscles which are antagonists in one movement may combine as prime movers in another.

-Movements, not muscles, are represented in cerebral motor areas. Muscles are not grouped unalterably in nervous control but can be variably combined as demands dictate. Thus serratus anterior and trapezius are opposed in scapular movement round

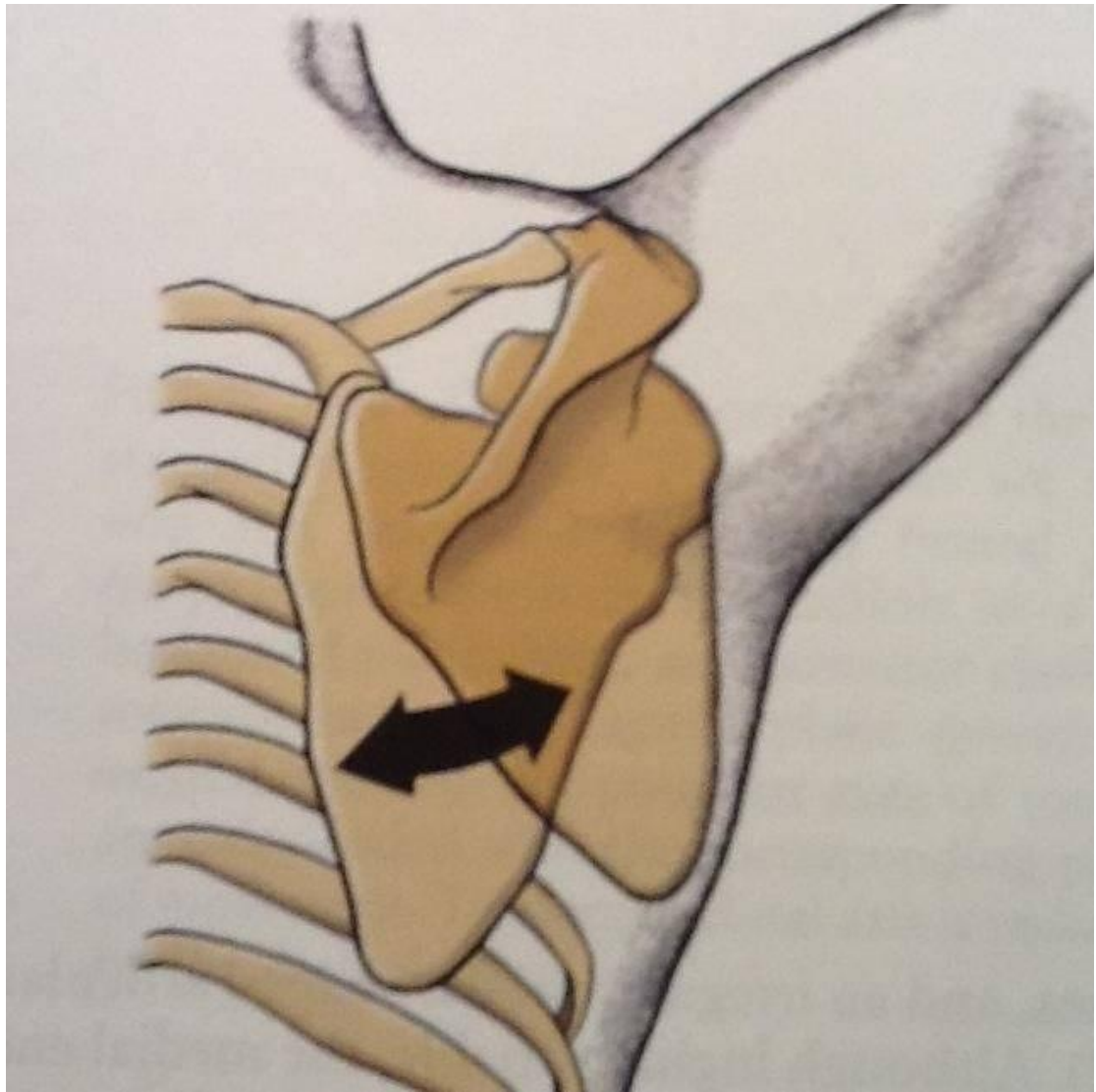
the thorax, but combine as prime movers in lateral rotation of the scapula.



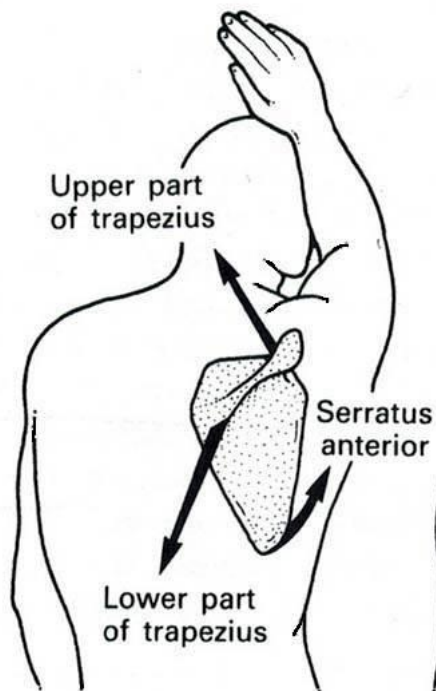
**Fig. 3.15** The movement of the scapula into: **a)** lateral (outward) rotation and **b)** medial (inward) rotation, represented in diagrammatic form indicating the direction of pull of the principal muscles involved.



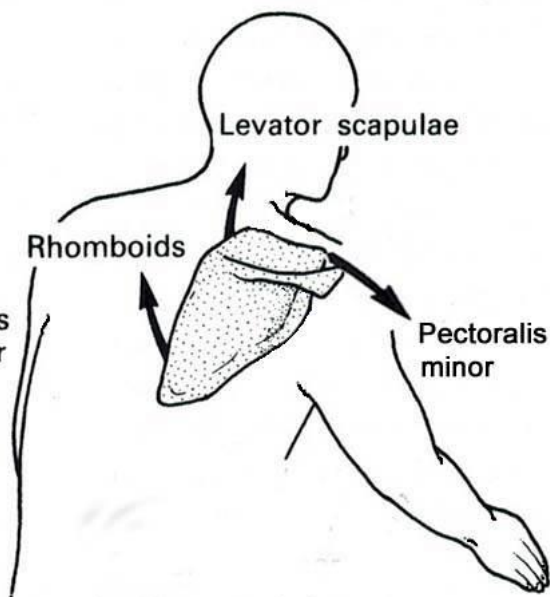
**upward rotation:** (UT) Upper Trap:  
(LT) Lower Trap: (SA) Serratus Anterior



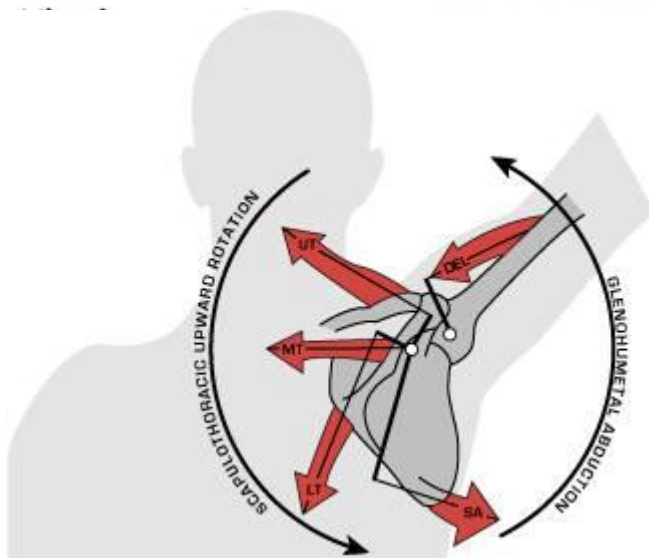




Upward rotators of the scapula



Downward rotators of the scapula





Elevation



Depression



Adduction (retraction)



Abduction (protraction)



Upward rotation



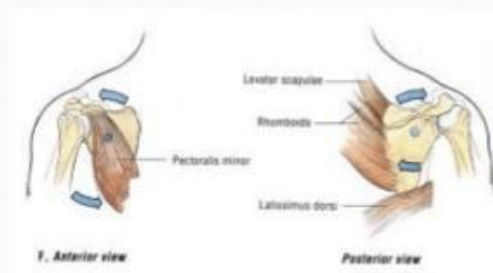
Downward rotation (return to anatomical position)



## Scapula Upward rotation and Downward rotation



**Superior trapezius**  
**Inferior trapezius**  
**Serratus anterior (Inferior part)**



**Pectoralis minor**  
**Levator Scapulae**  
**Rhomboids**  
**Latissimus dorsi**

Aliaa Omar El-hady Mai Rabie اقري ده الاول قبل ما تقرى الاختصار

....

lateral rotation is the upward and medial rotation is the downward

## Anatomy of UL- Shoulder girdle (7)

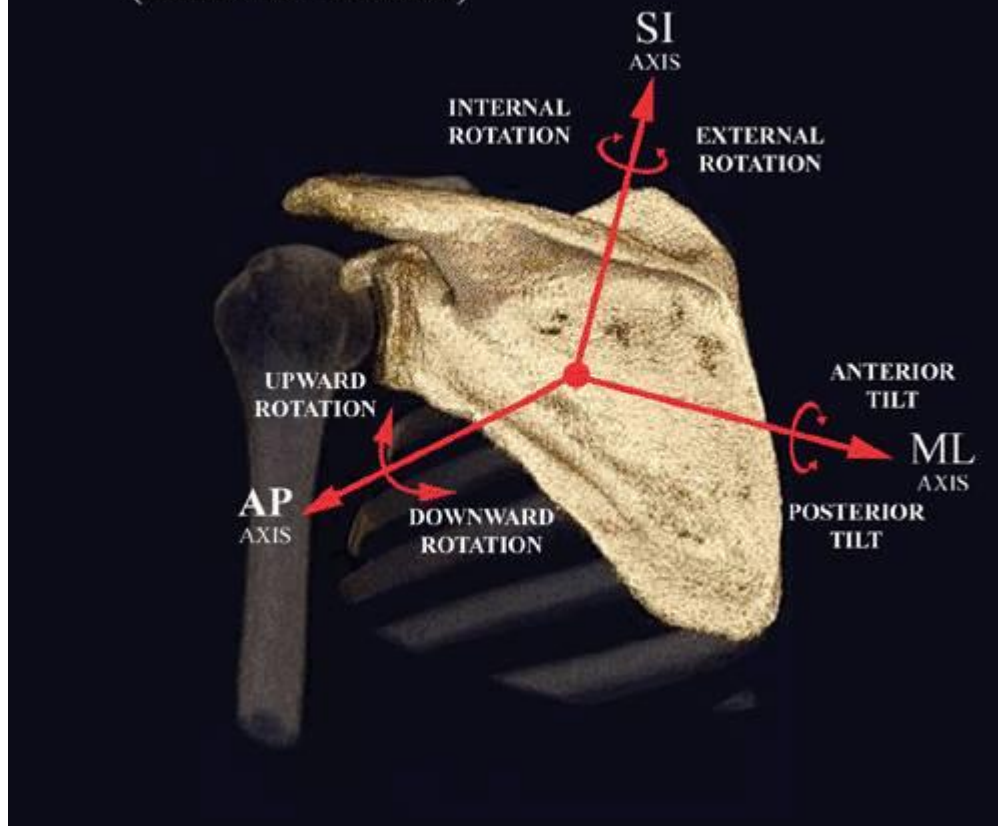
## MOVEMENTS OF THE PECTORAL (SHOULDER) GIRDLE (4)

ملخص ما سبق

Muscles of the Shoulder Girdle

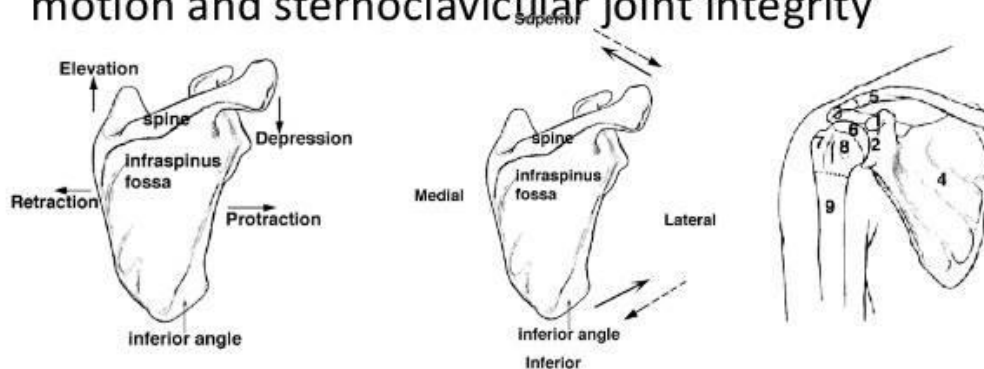
Muscle	Proximal Attachment	Distal Attachment	Primary Actions	Innervation
Levator scapula	C1-C4	Medial border of scapula from superior angle to spine	Elevation Retraction Downward rotation	Dorsal scapular (C5); C3, C4
Upper trapezius	Occipital protuberance & C1-C7	Lateral 1/3 clavicle & acromion process	Elevation Retraction Upward rotation	Spinal accessory nerve, C3, C4
Middle trapezius	T1-T5	Spine of scapula	Retraction	Spinal accessory nerve, C3, C4
Lower trapezius	T6-T12	Medial 1/3 scapular spine	Depression Upward rotation Retraction	Spinal accessory nerve, C3, C4
Rhomboids (upper & lower)	C7-T5	Medial border of scapula from spine to inferior angle	Downward rotation Retraction Elevation	Dorsal scapular (C4, C5)
Serratus anterior	Upper lateral surfaces of ribs 1-8(9)	Costal surface of entire vertebral border of scapula	Upward rotation Protraction	Long thoracic (C5-C7)
Pectoralis minor	Anterior surfaces of ribs 3-5 near costal cartilage	Coracoid process of scapula	Depression Downward rotation Upward tilt	Medial pectoral nerve (C6-8)
Subclavius	1 <sup>st</sup> rib at costal cartilage junction	Inferior surface of clavicle between costoclavicular & conoid ligaments	Depression	Subclavian branch (C5-C6)

## MOTIONS OF THE SCAPULA (AXES & PLANES)



## SCAPULOTHORACIC MOTION

- Its not a true joint but scapula glides freely on the loose aereolar tissue between two surfaces
- Direction of movement described by acromian motion and sternoclavicular joint integrity



- Rotation of scapula is facilitated by sternoclavicular and acromioclavicular joints



## Anatomy of UL- Shoulder girdle (8)

---

### 3- GLENOHUMERAL (SHOULDER) JOINT (1)

---

-The glenohumeral joint is a synovial multiaxial spheroidal joint between

the roughly hemispherical head of the humerus and the shallow glenoid

fossa of the scapula . (ball & socket)

-Notable for its relative lack of bony constraint, the joint possesses three degrees of freedom.

-Its static and dynamic stability depends on the surrounding muscular and soft tissue envelope more than on its shape and ligaments: effective function is achieved by a complex interaction between the articular and soft tissue restraints.

-It is the most mobile joint in the body and the most frequently dislocated.

Articulating surfaces: انظروا الرسومات

---

-The articular surfaces are reciprocally curved and are really ovoids. (Here, as in the hip, where ovoid surfaces are almost spherical they are often termed spheroidal.)

-The area of the humeral convexity exceeds that of the glenoid concavity such that only a small portion opposes the glenoid in any position .

-The remaining capitular articular surface is in contact with the capsule, so

that contact on the glenoid fossa is much more uniformly distributed

over its entire articular surface.

-The radius of curvature of the glenoid fossa in the coronal plane is greater than that of the humeral head, and is deepened by a fibrocartilaginous rim, the glenoid labrum .

-Both articular surfaces are covered by hyaline cartilage, which is thickest centrally and thinner peripherally over the humerus, and the reverse in the glenoid cavity.

-In most positions, their curvatures are not fully congruent, and the joint is loose-packed.

-Close packing (full congruence) is reached with the humerus abducted and laterally rotated .

-----

-----  
Glenoid labrum:

-----  
-The glenoid labrum is a fibrocartilaginous rim around the glenoid fossa.

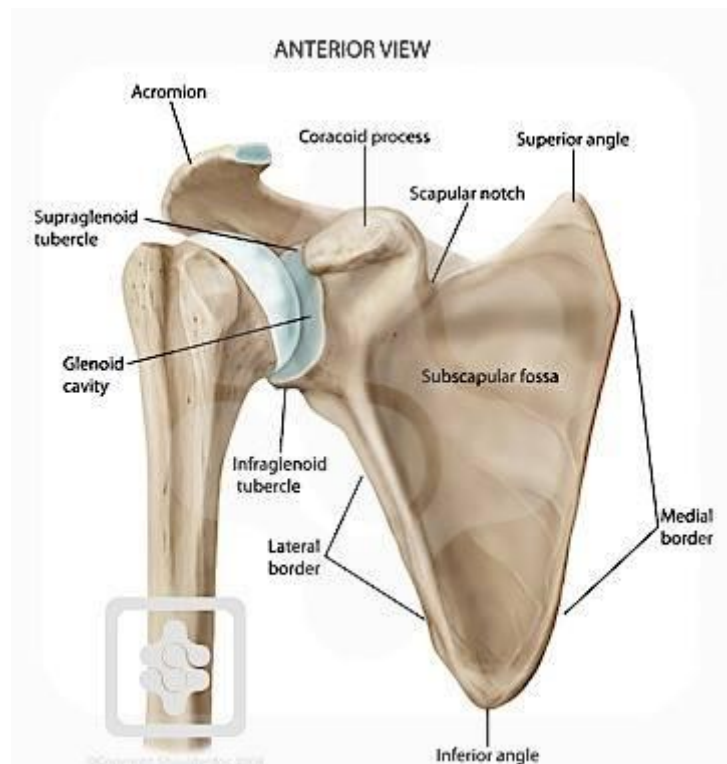
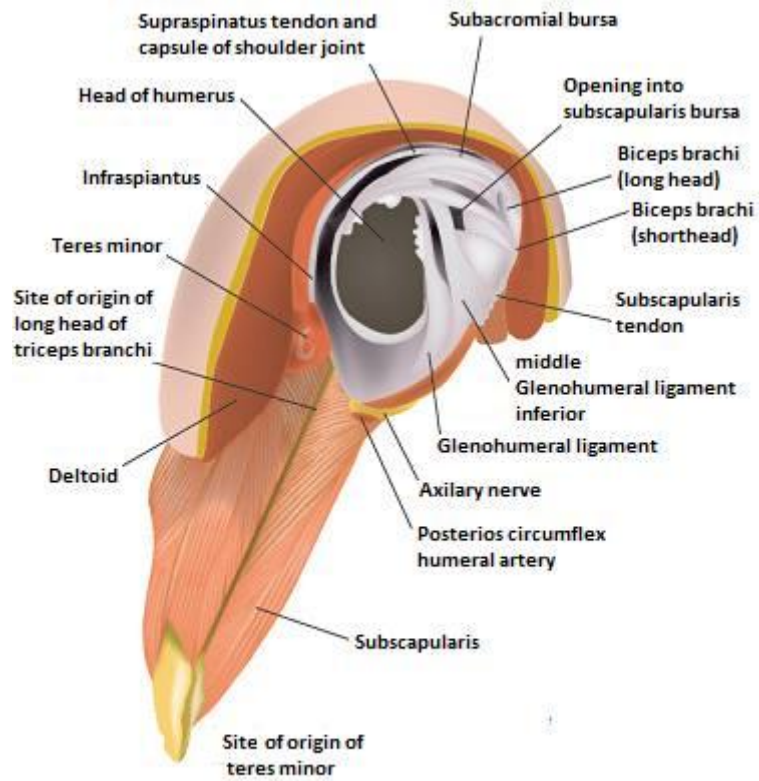
-It is triangular in section and varies in size and thickness; its base is attached to the margin of the fossa and its free inner edge projects as a continuation of the curve of the glenoid.

-It blends above with two fasciculi from the long tendon of biceps.

-The labrum deepens the cavity, may protect the bone, and probably assists lubrication.

-Its attachment is sometimes partly deficient anterosuperiorly, in which case synovial membrane may protrude through the gaps.





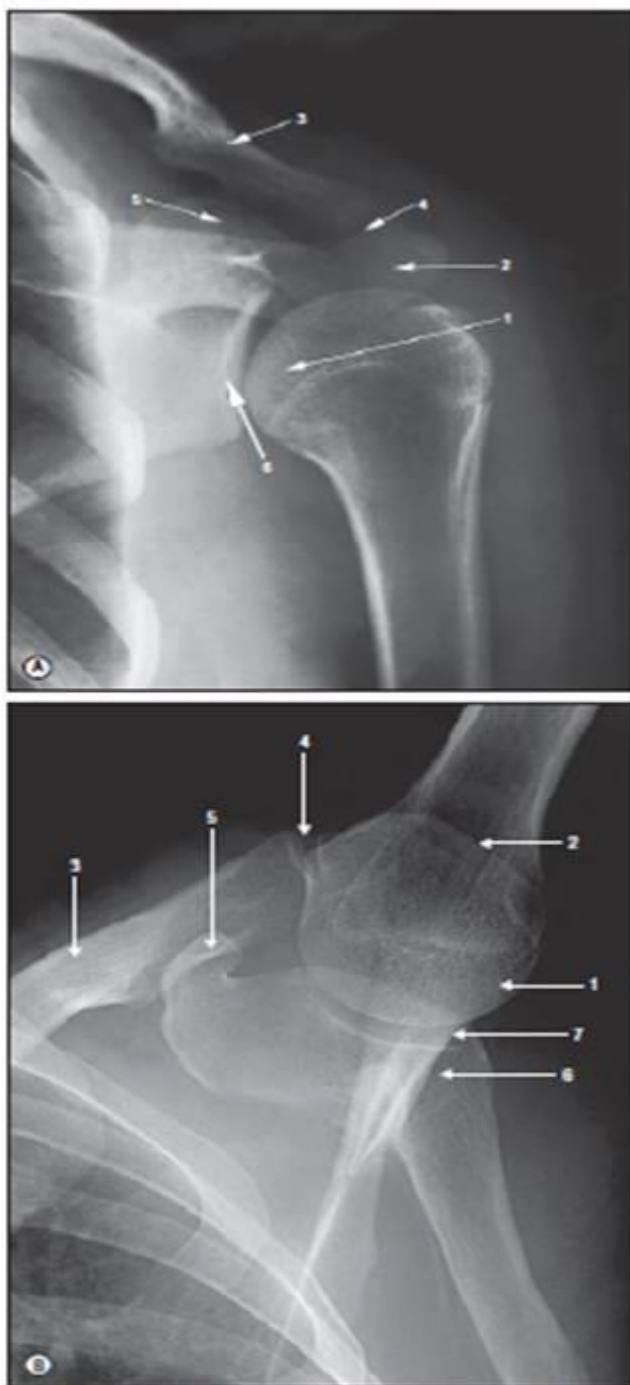
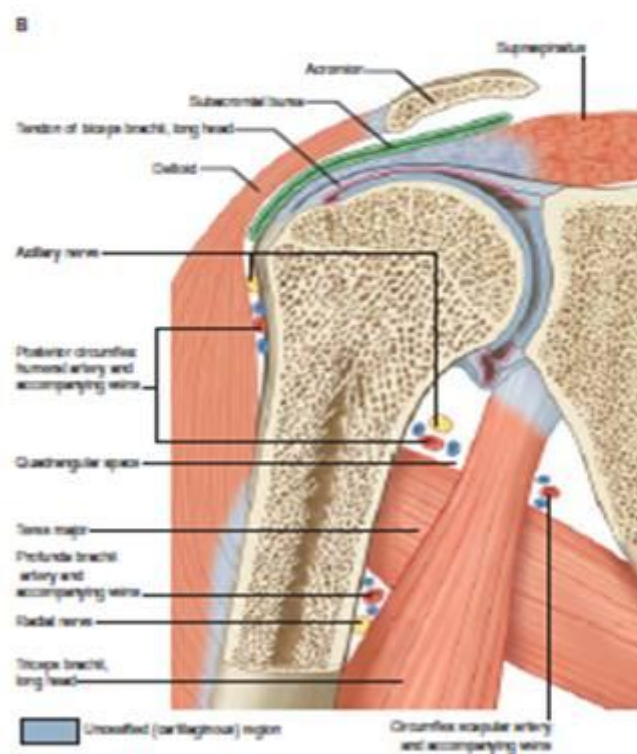
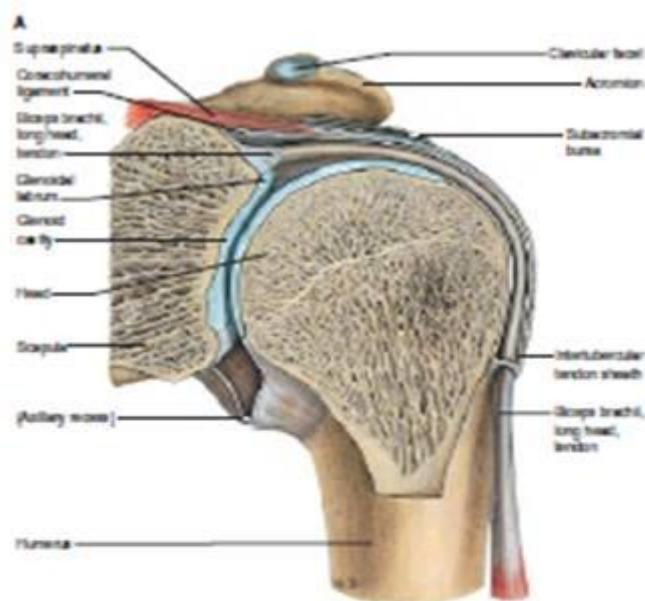
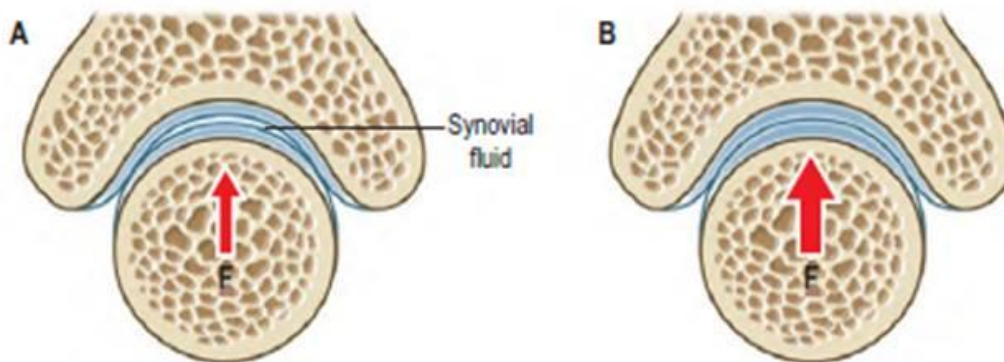


Fig. 46.15 Radiographs of the left shoulder of an 16 year old female in anteroposterior view (A) and axillary view with the arm abducted (B). 1. Head of humerus. 2. Acromion. 3. Clavicle. 4. Acromioclavicular joint. 5. Coracoid. 6. Glenoid. 7. Glenohumeral articulation.



**Fig. 46.16** Coronal sections through the left shoulder joint viewed from the posterior aspect. **A**, Anteriorly placed coronal section to show tendon of biceps, long head. (From Sobotta 2006.) **B**, Posteriorly placed coronal section to show subacromial bursa and contents of quadrangular space.





**Fig. 5.61** Some synovial joints are incongruent in the sense that the opposing articular surfaces have slightly different curvatures. This ensures that there is a fluid-filled gap between them when the joint is subjected to low loading (A). Under high loading (B) this gap disappears, but peak loading at the apex of the joint remains lower than it would be if the surfaces had the same curvature, and this is a major advantage for an incongruent joint. The shape of the concave articular surface is sometimes referred to as a Gothic arch. F = Loading force.

## Anatomy of UL- Shoulder girdle (9)

### 3- GLENOHUMERAL (SHOULDER) JOINT (2)

#### Fibrous capsule:

- A fibrous capsule envelops the joint.
- It is attached medially to the glenoid neck outside the glenoid labrum, and encroaches on the coracoid process to include the attachment of the long head of biceps.

- The capsule often extends and attaches to the base of the coracoid and to the body of the scapula, forming anterior and posterior recesses.
- Laterally, it is attached to the anatomical neck of the humerus, i.e. near the articular margin, except inferomedially, where it descends more than 1 cm on the humeral shaft.
- It is so lax that the bones can be distracted for 2 or 3 cm, which accords with the very wide range of movement possible at the glenohumeral joint.
- However, such unnatural separation requires relaxation of the upper capsule by abduction.
- The fibrous capsule is supported by the tendons of supraspinatus (above), infraspinatus and teres minor (behind), subscapularis (in front) and by the long head of triceps (below).
- The rotator interval is a medially based triangular area of uncovered capsule between the superior edge of subscapularis and the anterior edge of supraspinatus as these tendons pass on either side of the base of the coracoid: it may represent an area of weakness that increases instability in some shoulders.
- Triceps is separated from the capsule by the axillary nerve and posterior circumflex humeral vessels as they pass back from the axilla.
- The capsule is least supported inferiorly, and subjected to the greatest strain in full abduction, when it is stretched tightly across the humeral head.
- It is strengthened anteriorly by extensions from the tendons of pectoralis major and teres major.
- There are usually two or three openings in the capsule:
  - 1-below the coracoid process, connecting the joint to a bursa behind the tendon of subscapularis (anterior);
  - 2-between the humeral tubercles, transmitting the long tendon of biceps and its synovial sheath;
  - 3-connecting the joint to a bursa under the tendon of infraspinatus (posterior and inconstant)

**B**

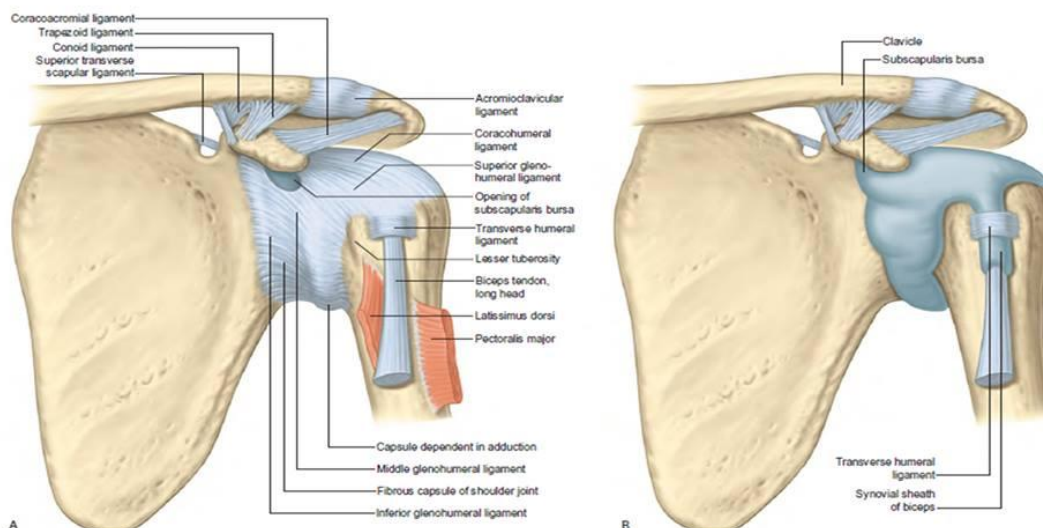
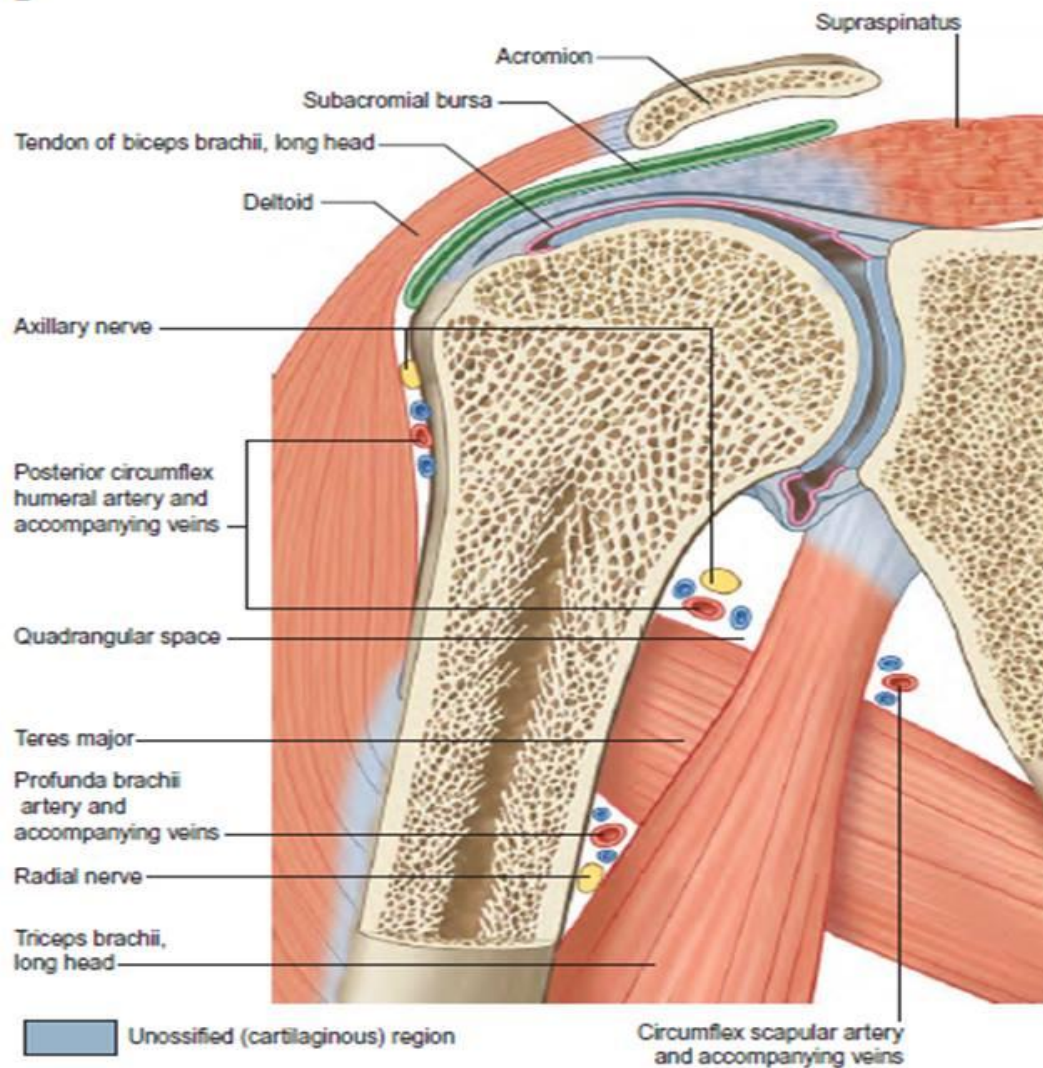
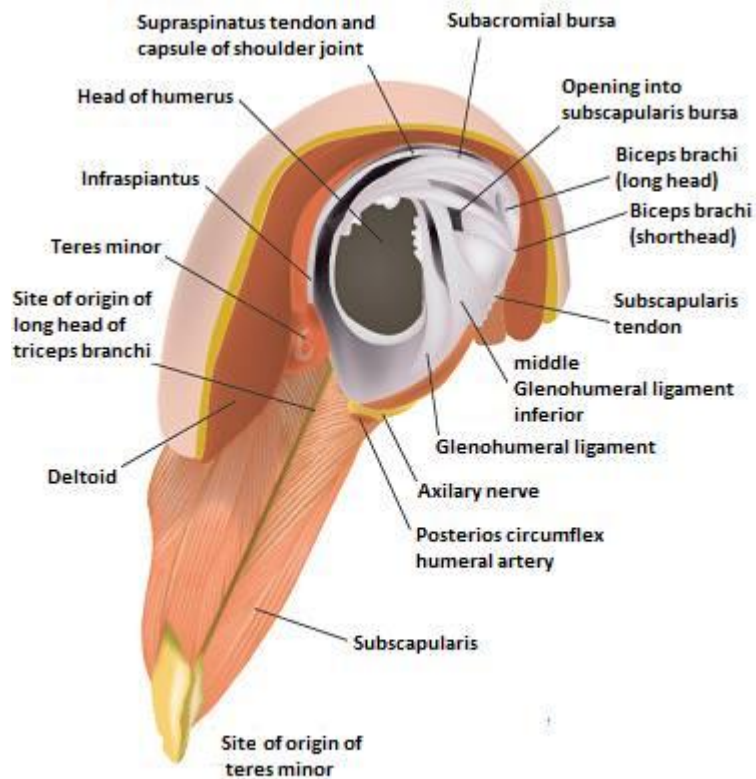
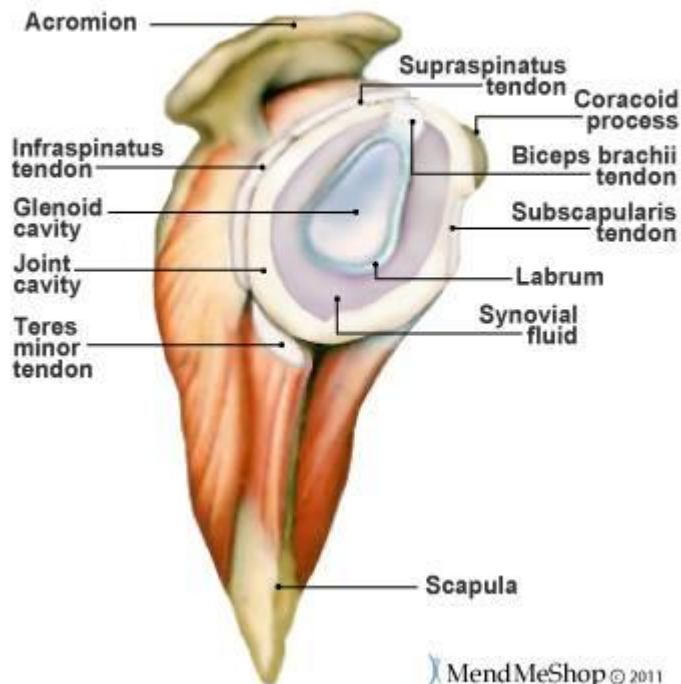
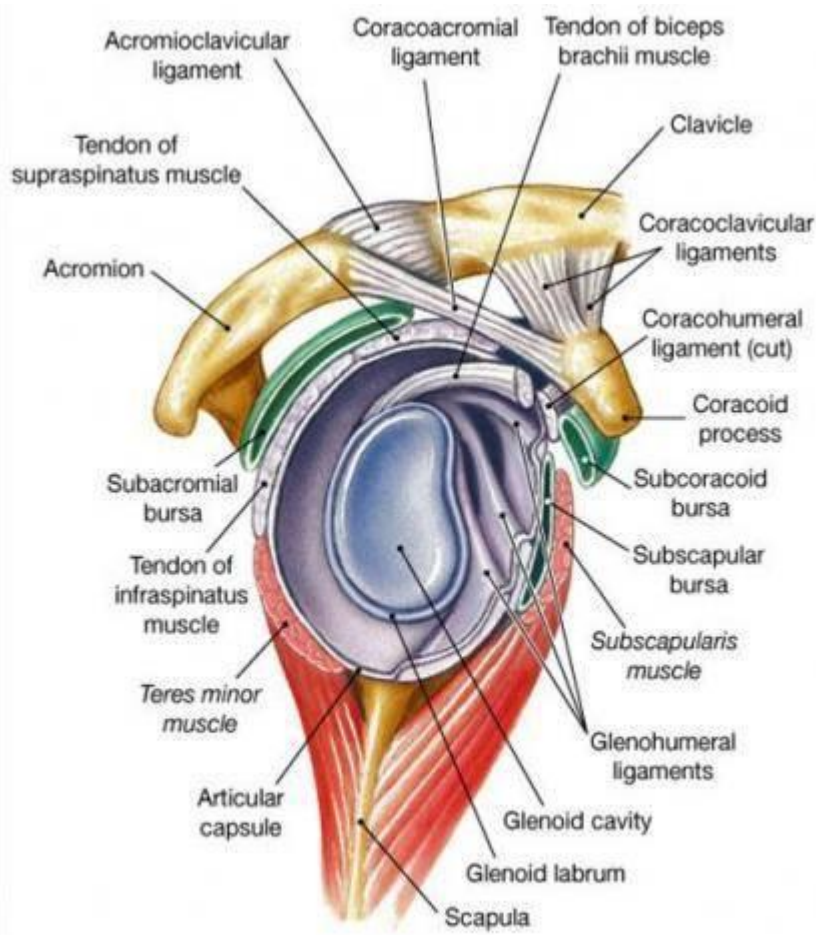


Fig. 46.14 A, The anterior aspect of the left shoulder. B, A deeper view of the anterior aspect than in (A), showing the subscapularis bursa.

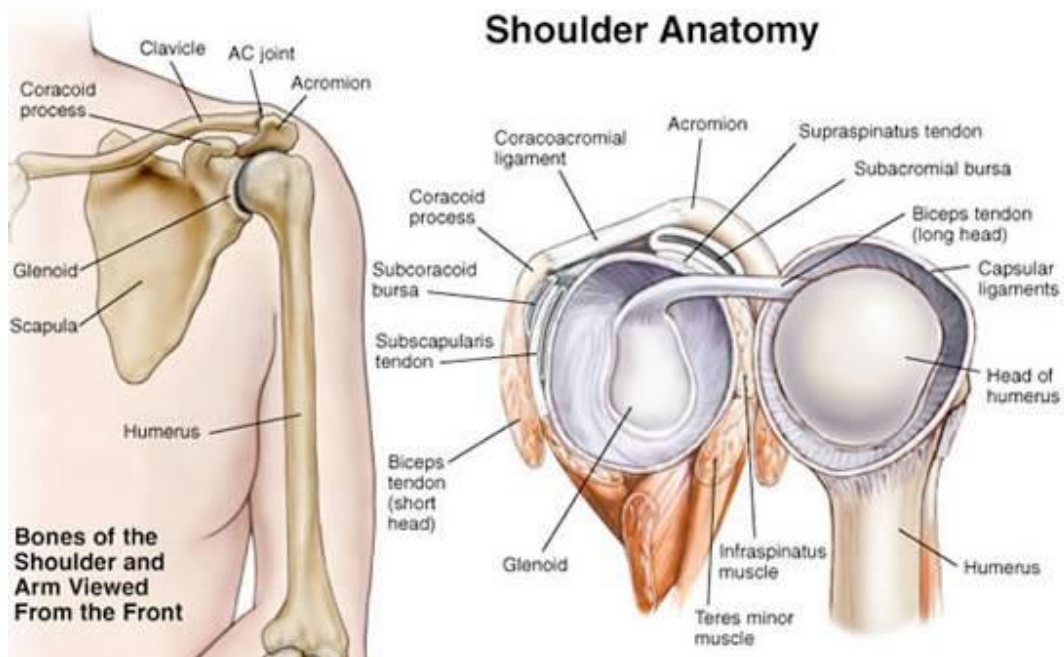


# Anatomy of the Shoulder Joint Capsule

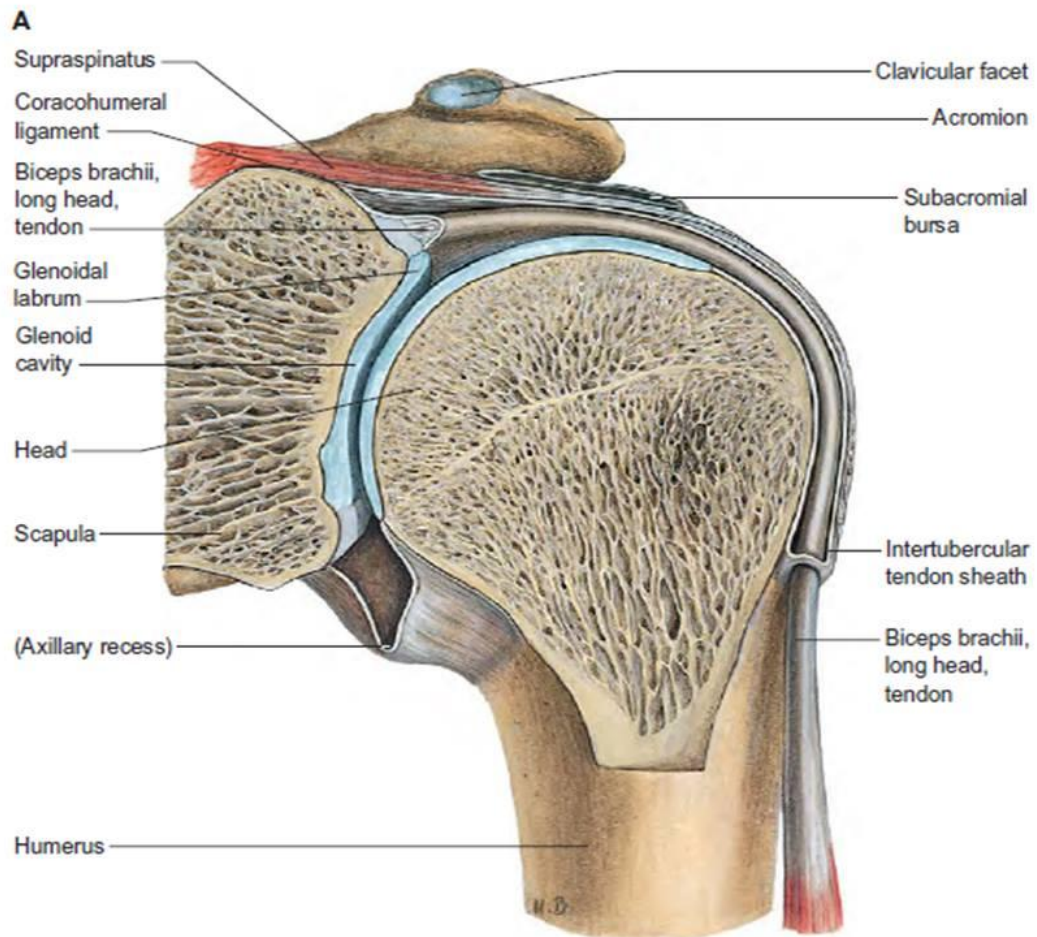
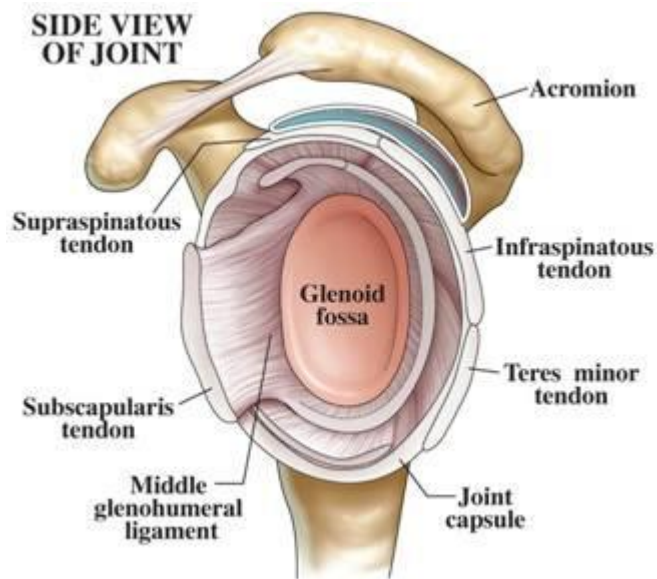




(b) Lateral view of pectoral girdle







## Anatomy of UL- Shoulder girdle (10)

### 3- GLENOHUMERAL (SHOULDER) JOINT (3)

## Ligaments:

---

-The ligaments associated with the glenohumeral joint are the glenohumeral (superior, middle and inferior), coracohumeral and transverse humeral.

### Glenohumeral ligaments:

---

-Three glenohumeral ligaments, only visible from within the joint, reinforce the capsule anteriorly and inferiorly .

-They do not act as traditional ligaments (which carry a pure tensile force along their length), but become taut at varying positions of abduction and humeral rotation, acting as ‘check-reins’.

-Moreover, they do not have the strength characteristics of the ligaments at the knee.

#### 1-The superior glenohumeral ligament

---

-passes from the supraglenoid tubercle, just anterior to the origin of the long head of biceps, to the humerus near the proximal tip of the lesser tubercle on the medial ridge of the intertuberculous groove, the fovea capitis.

-It forms an anterior cover around the long head of biceps, and is part of the rotator interval.

-Together with the coracohumeral ligament it is an important stabilizer in the inferior direction, helping to keep the humeral head suspended (the coracohumeral ligament is more robust than the superior glenohumeral ligament).

#### 2-The middle glenohumeral ligament

---

-arises from a wide attachment below the superior glenohumeral ligament, along the anterior glenoid margin as far as the inferior third of the rim, and passes obliquely inferolaterally, enlarging as it does, to attach to the lesser tubercle deep to the tendon of subscapularis, with which it blends.

-The width and thickness of this ligament may be as much as 2 cm and 4 mm respectively.

-It provides anterior stability at 45° and 60° abduction.

### 3- The thicker and longer inferior glenohumeral ligament complex

---

-is a hammock-like structure with anchor points on the anterior and posterior sides of the glenoid.

-It arises from the anterior, middle and posterior margins of the glenoid labrum, below the epiphysial line, and passes anteroinferiorly to the inferior and medial aspects of the neck of the humerus.

-The anterior, superior edge of the inferior ligament is thickened as the superior band, and the diffuse thickening of the anterior part of the capsule to which it is attached is known as the axillary pouch.

-The anterior band of the inferior glenohumeral ligament is thought to be the primary static anterior stabilizer of the abducted and externally rotated glenohumeral joint.

### 4- Coracohumeral ligament

---

-The coracohumeral ligament is attached to the dorsolateral base of the coracoid process and extends as two bands, which blend with the capsule, to the greater and lesser tubercles .

-Portions of the coracohumeral ligament form a tunnel for the biceps tendon on the anterior side of the joint.

-The rotator interval is reinforced by the coracohumeral ligament.

-It also blends inferiorly with the superior glenohumeral ligament.

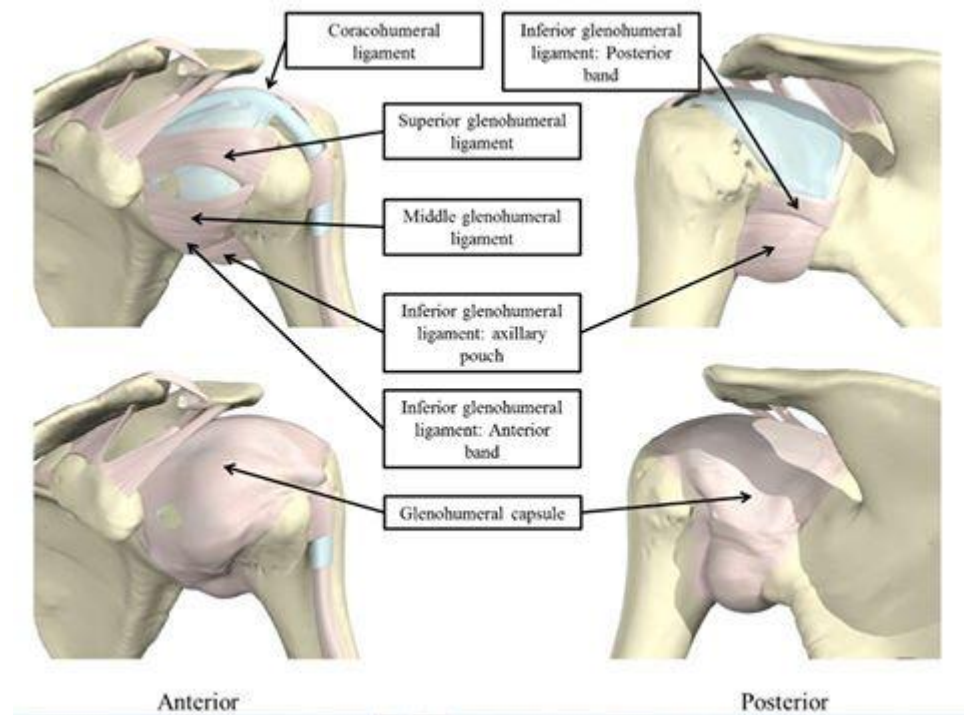
### 5- Transverse humeral ligament

---

-The transverse humeral ligament is a broad band which passes

between the humeral tubercles, and is attached superior to the epiphysial line .

- It converts the intertubercular sulcus into a canal, and acts as a retinaculum for the long tendon of biceps.



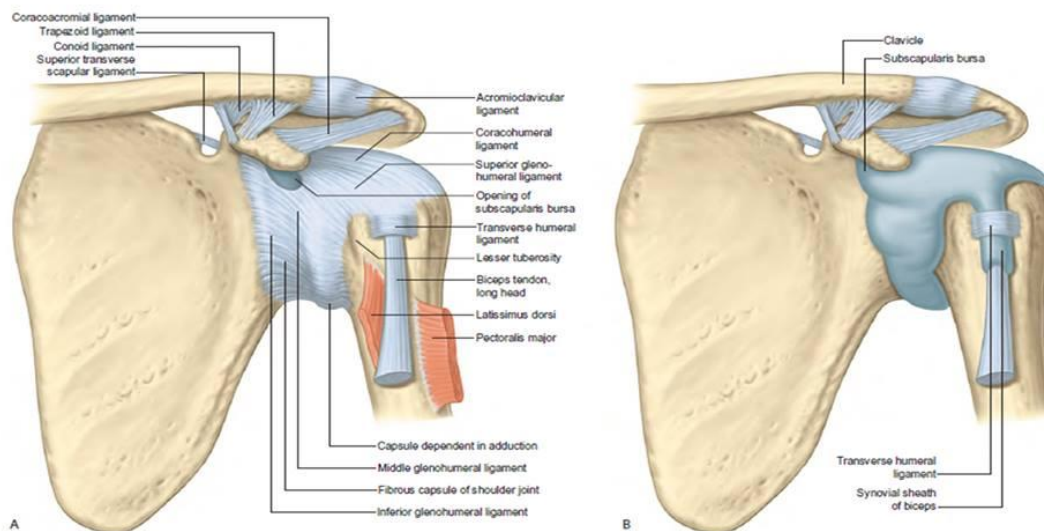
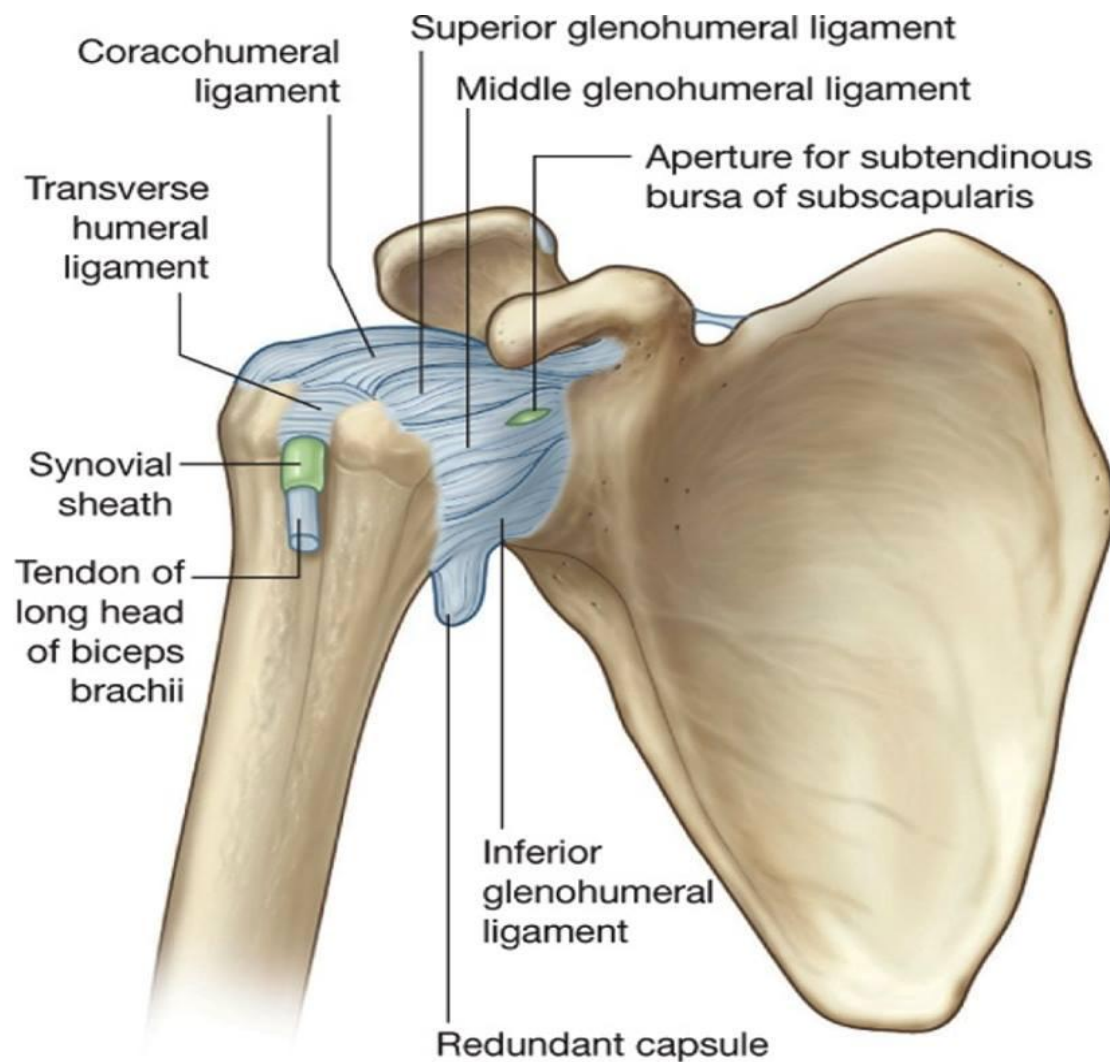


Fig. 46.14 A, The anterior aspect of the left shoulder. B, A deeper view of the anterior aspect than in (A), showing the subscapularis bursa.





## Anatomy of UL- Shoulder girdle (11)

---

### 3- GLENOHUMERAL (SHOULDER) JOINT (4)

---

---

#### Synovial membrane:

---

The synovial membrane lines the capsule and covers parts of the anatomical neck.

The long tendon of biceps traverses the joint in a synovial sheath which continues into the intertubercular sulcus as far as the surgical neck of the humerus .

#### Bursae:

---

Many bursae adjoin the shoulder joint.

They are usually found between the tendon of subscapularis and the capsule, communicating with the joint between the superior and middle glenohumeral ligaments; on the superior acromial aspect; between the coracoid process and capsule; between teres major and the long head of triceps: anterior and posterior to the tendon of latissimus dorsi.

The subacromial bursa, between deltoid and the capsule, does not communicate with the joint cavity but is prolonged under the acromion and coracoacromial ligament, and between them and supraspinatus: it appears to be attached, together with the subdeltoid fascia, to the acromion.

Bursae sometimes occur behind coracobrachialis and between the tendon of infraspinatus and the capsule, occasionally opening into the joint.

#### Vascular supply:

---

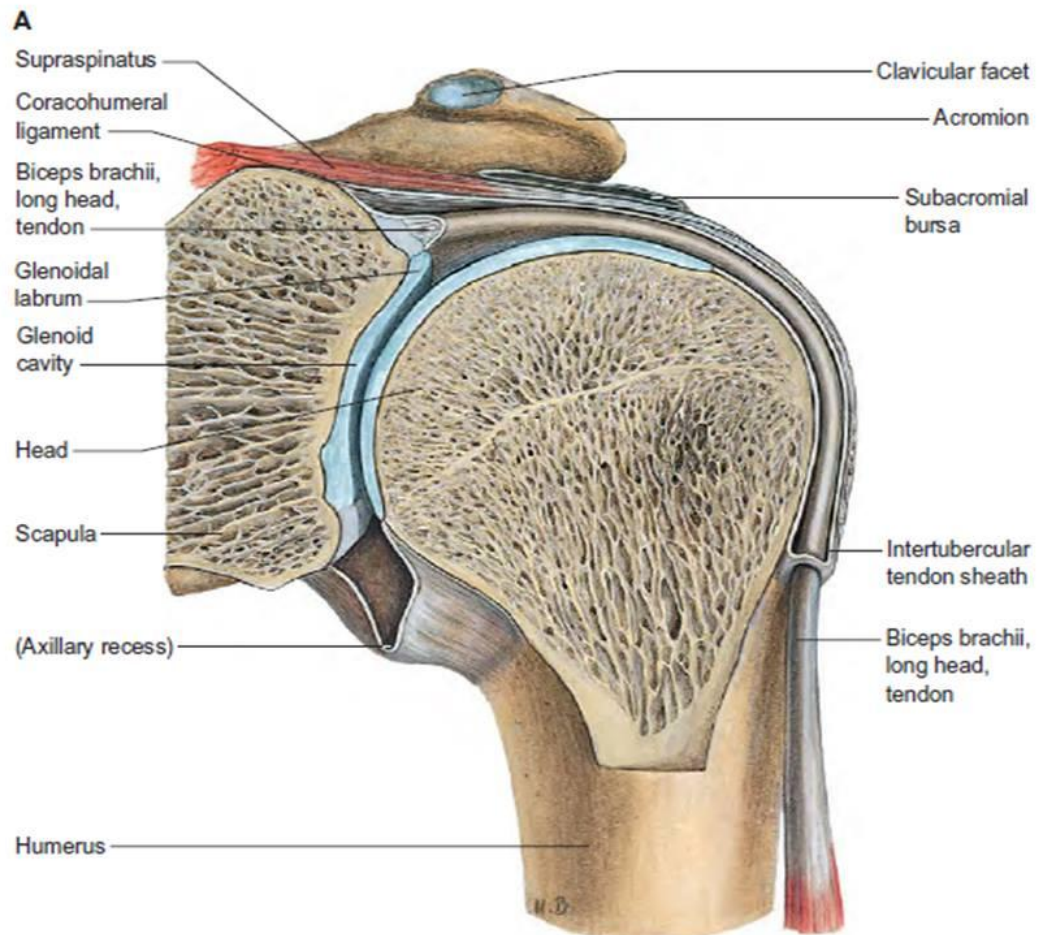
The glenohumeral joint is supplied by branches from the anterior and posterior circumflex humeral, suprascapular and circumflex scapular vessels.

#### Innervation :

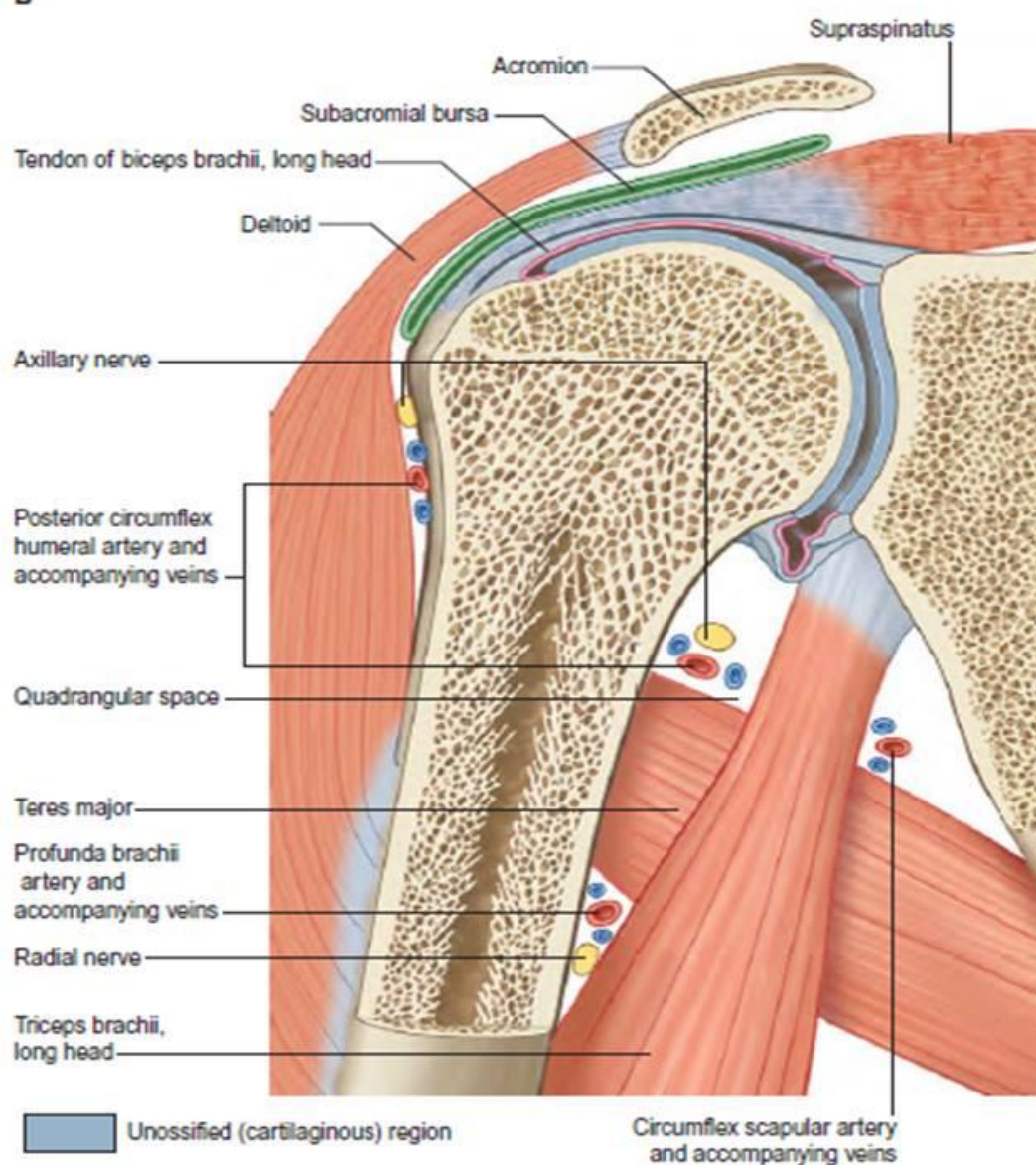
---

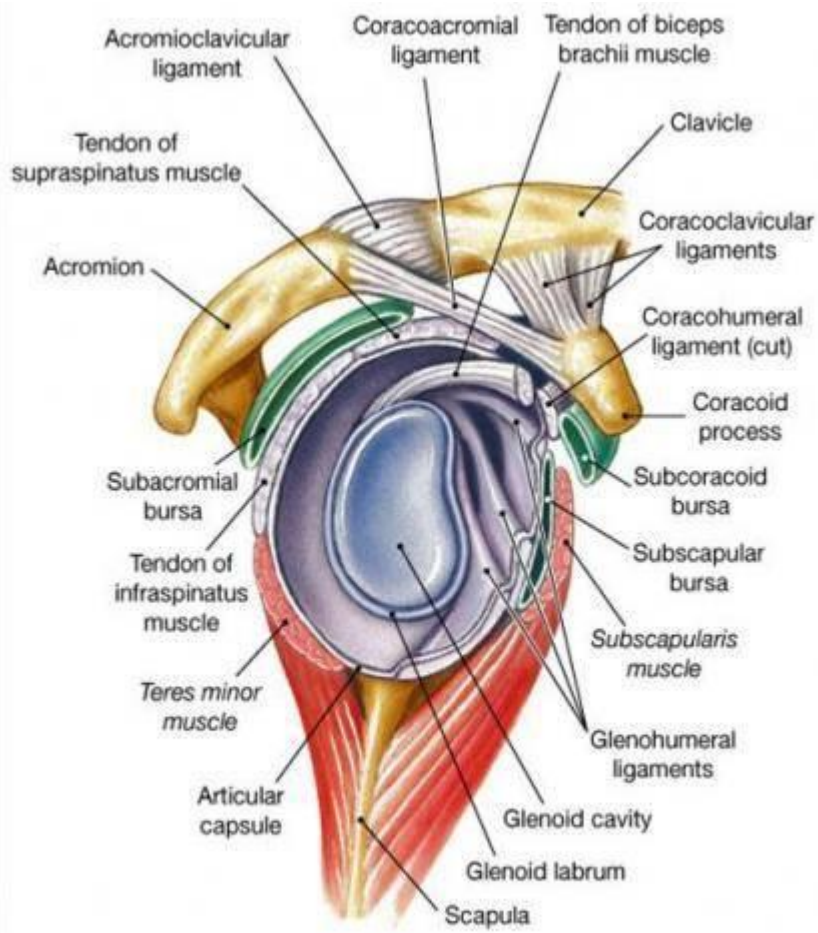
The glenohumeral joint is innervated mainly from the posterior

The capsule is supplied by the suprascapular nerve (posterior and superior parts), axillary nerve (anteroinferior) and the lateral pectoral nerve (anterosuperior).



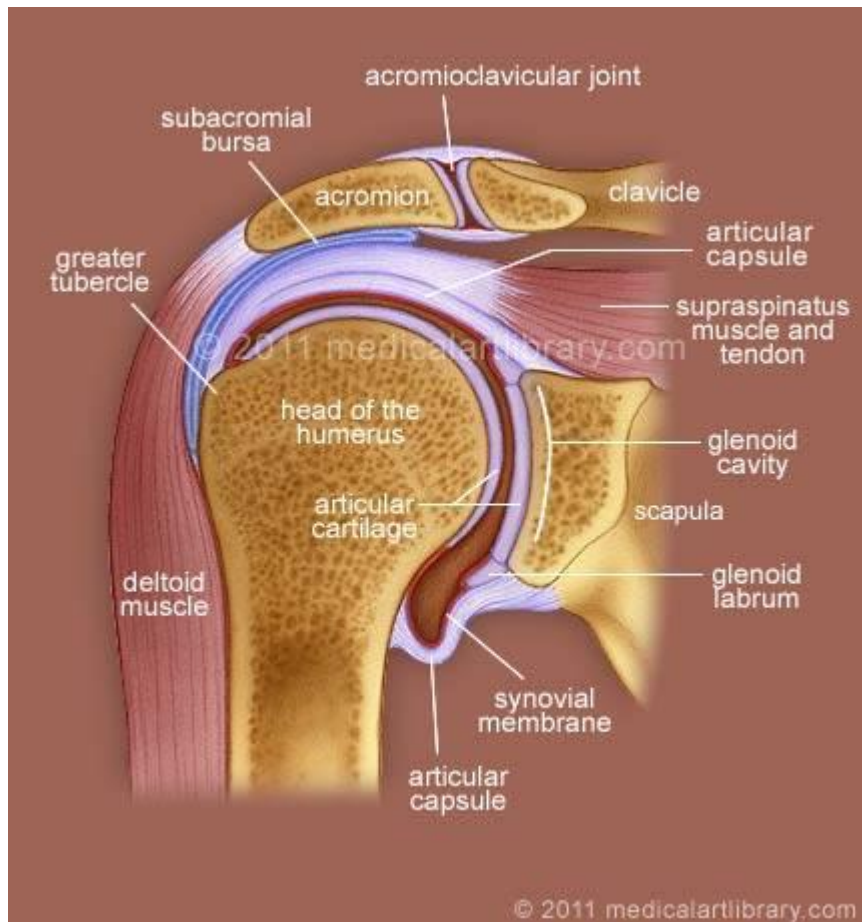
B



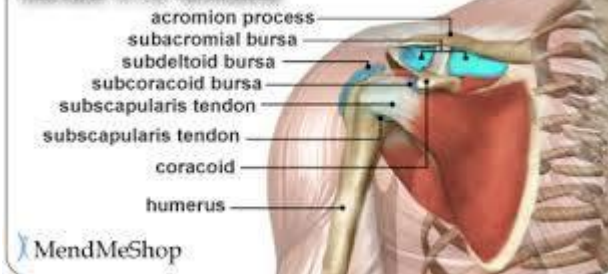


**(b) Lateral view of pectoral girdle**



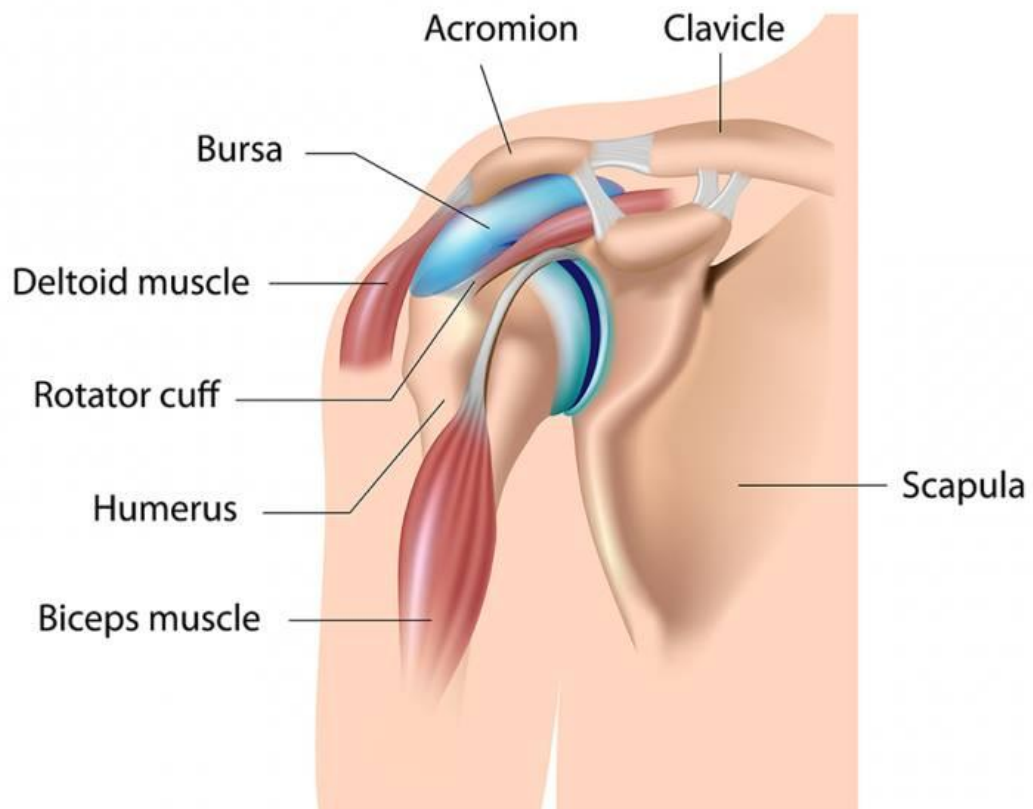
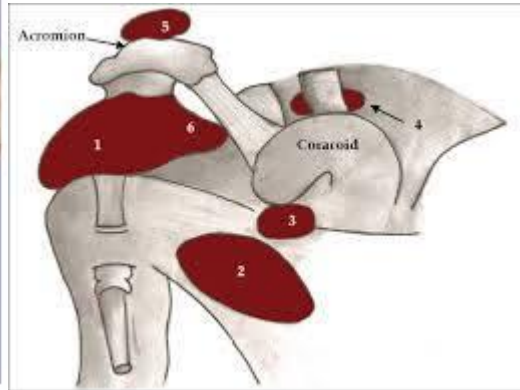
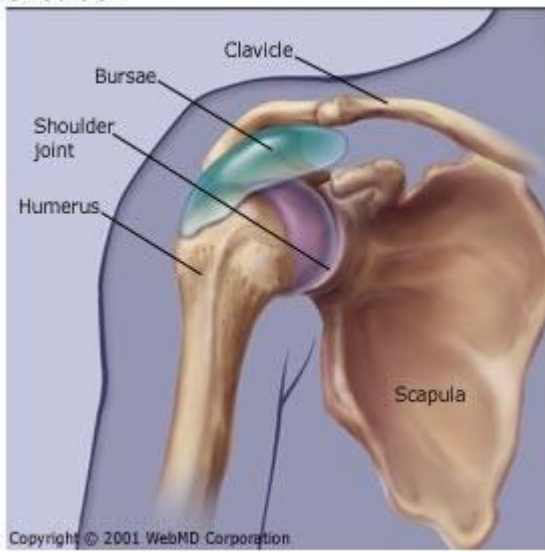


#### Bursae in the Shoulder





## Shoulder





2-The coracoacromial arch (coracoid coracoid, acromion and coracoacromial ligament) prevents upward dislocation of the humerus.

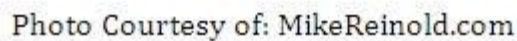
3-The tendons of subscapularis, supraspinatus, infraspinatus and teres minor fuse with the lateral part of the joint capsule to form the 'rotator cuff'.

4-These short muscles collectively produce a compressive force during active glenohumeral movements which maintains congruent contact between the head of the humerus and the glenoid fossa, helps to resist skid, and checks excessive translation.

5-The rotator cuff also provides strong lateral stability and prevents this part of the lax capsule from being nipped during joint movements.

6-The long head of biceps offers additional superior support.

7-The long head of triceps offers inferior support which is particularly important when the shoulder is abducted. However, the glenohumeral joint is least stable inferiorly when the shoulder is fully abducted.



-Laxity of the capsule, and a humeral head which is large relative to a shallow glenoid fossa, afford a wider range of

movement than at any other joint.

- Flexion–extension, abduction–adduction, circumduction and medial and lateral rotation all occur at the shoulder.

- Although the majority of the movement of the shoulder occurs at the glenohumeral joint, there is a varying contribution from the scapulothoracic articulation in most directions, most significantly in abduction, and excluding lateral rotation.

- In analysis of shoulder movements it is preferable to refer humeral movement to the scapula, rather than to conventional anatomical planes .

- When the arm hangs at rest the glenoid fossa faces almost equally forwards and laterally, and the humeral capitular and scapular axes correspond, although the humerus, relative to the anatomical position, is medially rotated.

- Flexion carries the arm anteromedially on an axis through the humeral head orthogonal to the glenoid fossa at its centre.

- Abduction and adduction occur in a vertical plane orthogonal to that of flexion–extension; the axis is horizontal, through the humeral head, parallel with the glenoid plane.

- Pure abduction raises the arm anterolaterally in the plane of the scapula.

- However, when referred to the trunk, flexion and extension occur in the paramedian plane, and abduction and adduction in the coronal plane.

- In this sense, raising the arm vertically from flexion or raising it from abduction are both accompanied by humeral rotation in opposite directions.

- In ‘pure’ flexion–extension, in a plane orthogonal to the scapula the axis of movement, and the notional ‘mechanical



axis', are regarded as projected from the centre of the glenoid cavity.

-Glenohumeral abduction is approximately  $90^\circ$ , but angles up to  $120^\circ$  have been reported. Some  $60^\circ$  further abduction occurs at the sterno- and acromioclavicular articulations.

-Contralateral vertebral flexion also aids in bringing the arm to the vertical.

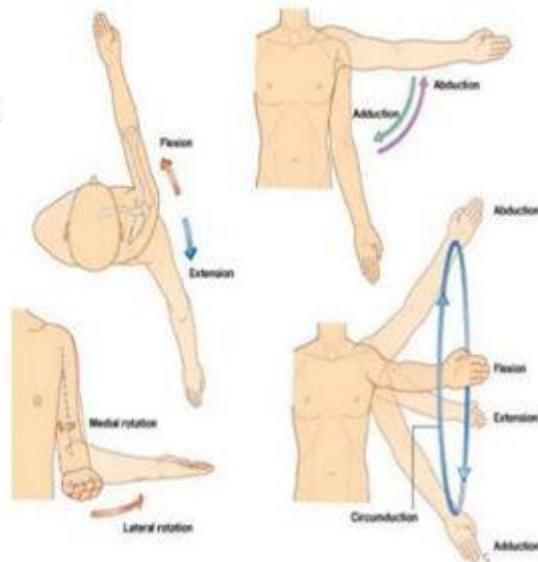
-During active elevation, movements at the glenohumeral and acromioclavicular joints are simultaneous, except in the initial few degrees, when most, often all, movement is glenohumeral.

-For every  $15^\circ$  of elevation, glenohumeral movement is said to be  $10^\circ$  and scapular movement  $5^\circ$ .

cont.

## Movements at the shoulder joint

- It is a freely mobile joint.
- The following movements occur at the joint:-
- Abduction
- Adduction
- Flexion
- Extension
- Lateral rotation
- Medial rotation and
- Circumduction



12/18/2014



-During the initial stages of abduction, subscapularis, infraspinatus and teres minor counteract the strong upward component of pull of deltoid, which would otherwise cause the humeral head to slide up; the additive turning moments exerted by deltoid and supraspinatus about the shoulder joint can then abduct the arm. هاهناaaaaaaaaaaaaاام جدا

-In flexion, the humerus swings at right angles to the scapular plane and scapular rotation cannot increase the elevation ( $120^\circ$ ) obtainable in full flexion.

-If the fully flexed humerus is also abducted, elevation increases pro rata until, when the humerus reaches the scapular plane, i.e. when true abduction is reached,  $180^\circ$  of elevation becomes possible.

-In medial or lateral rotation, the humerus revolves about one quarter of a circle around a vertical axis; the range is greatest when the arm is pendent, and least when it is vertical.

-When assessing the rotational range at the glenohumeral joint, the forearm should be flexed to a right angle at the elbow: this will prevent the effects of superadded pronation or supination in the pendent limb.

-In circumduction, which is a succession of the foregoing movements, the distal end of the humerus describes the base of a cone, its apex at the humeral head.

-This glenohumeral movement can be much increased by scapular movements, e.g. in acts of slinging objects with force.

-The peculiar relation of the long head of biceps to the shoulder joint

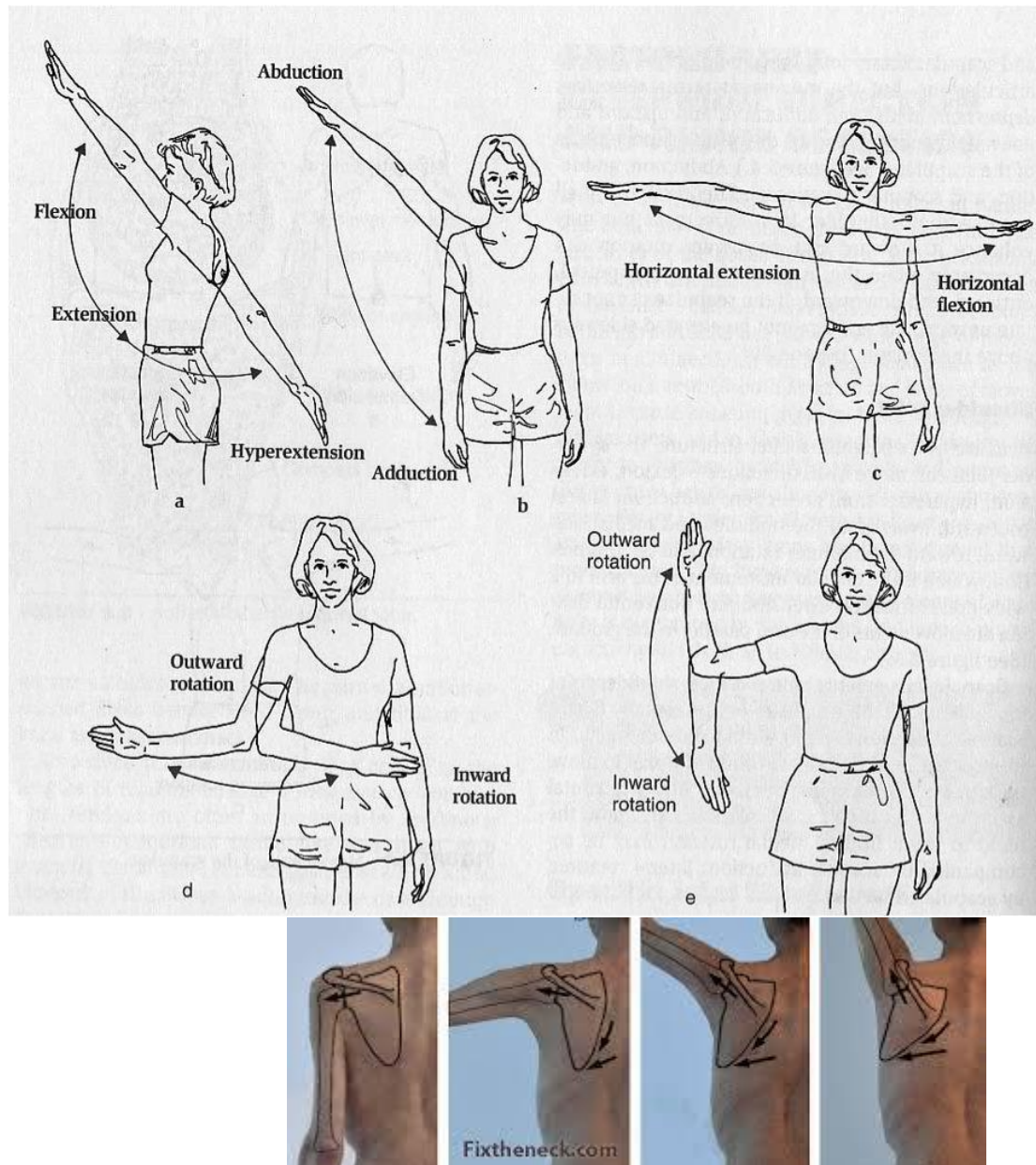
may serve several purposes. By its connection with both the shoulder

and elbow, the muscle harmonizes their actions as an elastic ligament

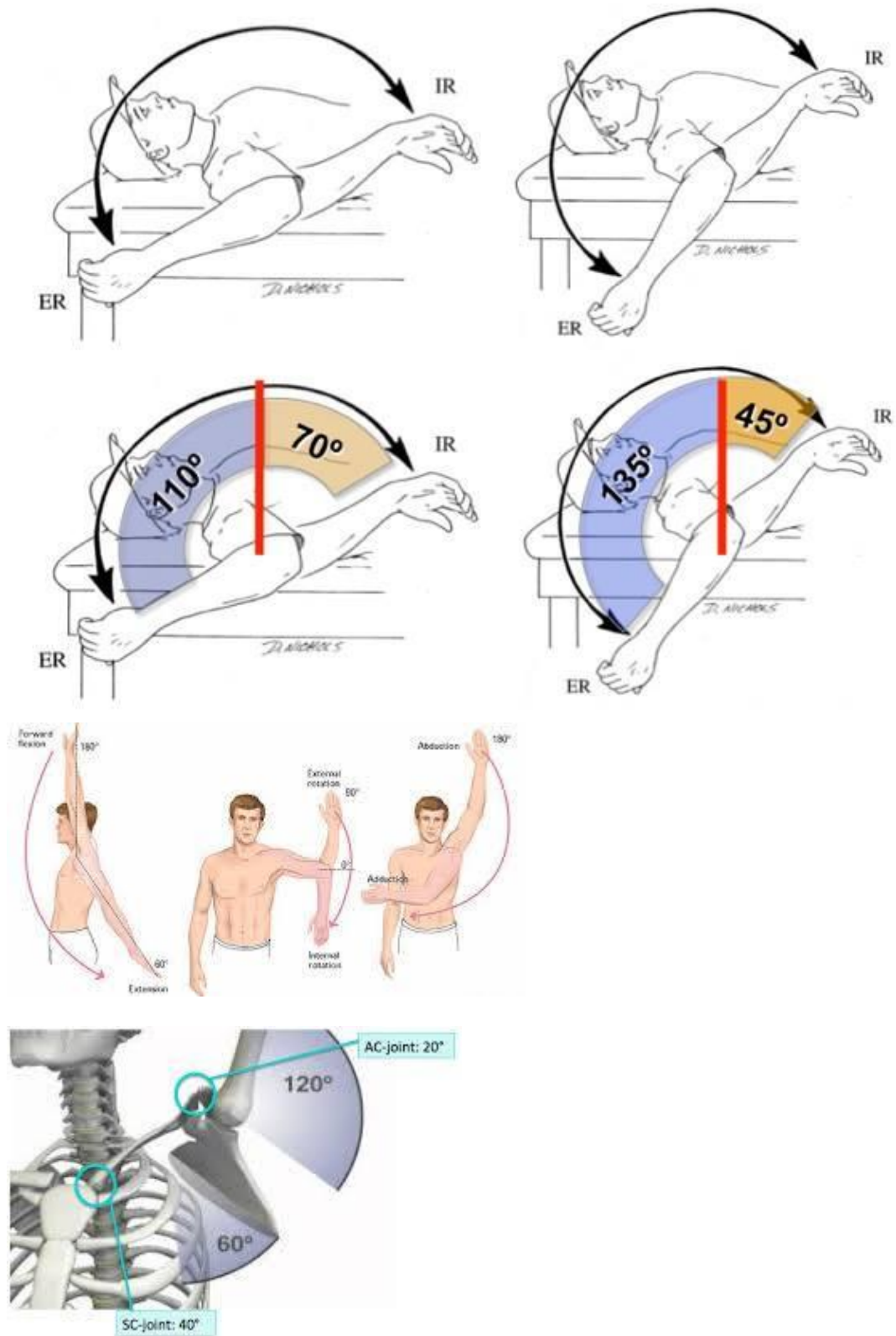
during all their movements. It helps to prevent the humeral head impinging on the acromion when deltoid contracts and to steady

it in  
movements of the arm.

-In paralysis of supraspinatus it may also help initiate abduction of the arm, particularly when the humerus is laterally rotated.







Anatomy of UL- Shoulder girdle (15)

3- GLENOHUMERAL (SHOULDER) JOINT (8)



## Muscles producing movements

---

-The muscles which produce movements at the glenohumeral joint are principally deltoid, pectoralis major, latissimus dorsi and teres major.

-These long muscles all converge on the humerus, acting at mechanical advantage on a joint which, as a result of glenoid shallowness and capsular laxity, is relatively unstable.

-The long muscles are counteracted by the rotator cuff, a group of short

muscles (subscapularis, supraspinatus, infraspinatus and teres minor)

which are attached nearer to the joint, and which centre the head of the humerus in the glenoid fossa through the midrange of motion, when the capsuloligamentous structures are lax.

-Flexion:

---

-Pectoralis major (clavicular part), deltoid (anterior fibres) and coracobrachialis assisted by biceps. The sternocostal part of pectoralis

major is a major force in flexion forwards to the coronal plane from

full extension.

Extension:

---

-Deltoid (posterior fibres) and teres major, from the dependent position. When the fully flexed arm is extended against resistance, latissimus dorsi and the sternocostal part of pectoralis major act powerfully until the arm reaches the coronal plane.

Abduction:

---

-Deltoid. Initially its effect is mainly upward and, unless opposed, this would displace the humerus upwards.

Subscapularis, infraspinatus and teres minor exert downward traction and so apply an opposing force: together with deltoid

they constitute a 'couple' to produce abduction in the scapular plane.

-Supraspinatus assists in effecting and maintaining this movement, but its precise role is controversial.

Medial rotation:

-----

-Pectoralis major, deltoid (anterior fibres), latissimus dorsi, teres major and, with the arm pendent, subscapularis.

Lateral rotation:

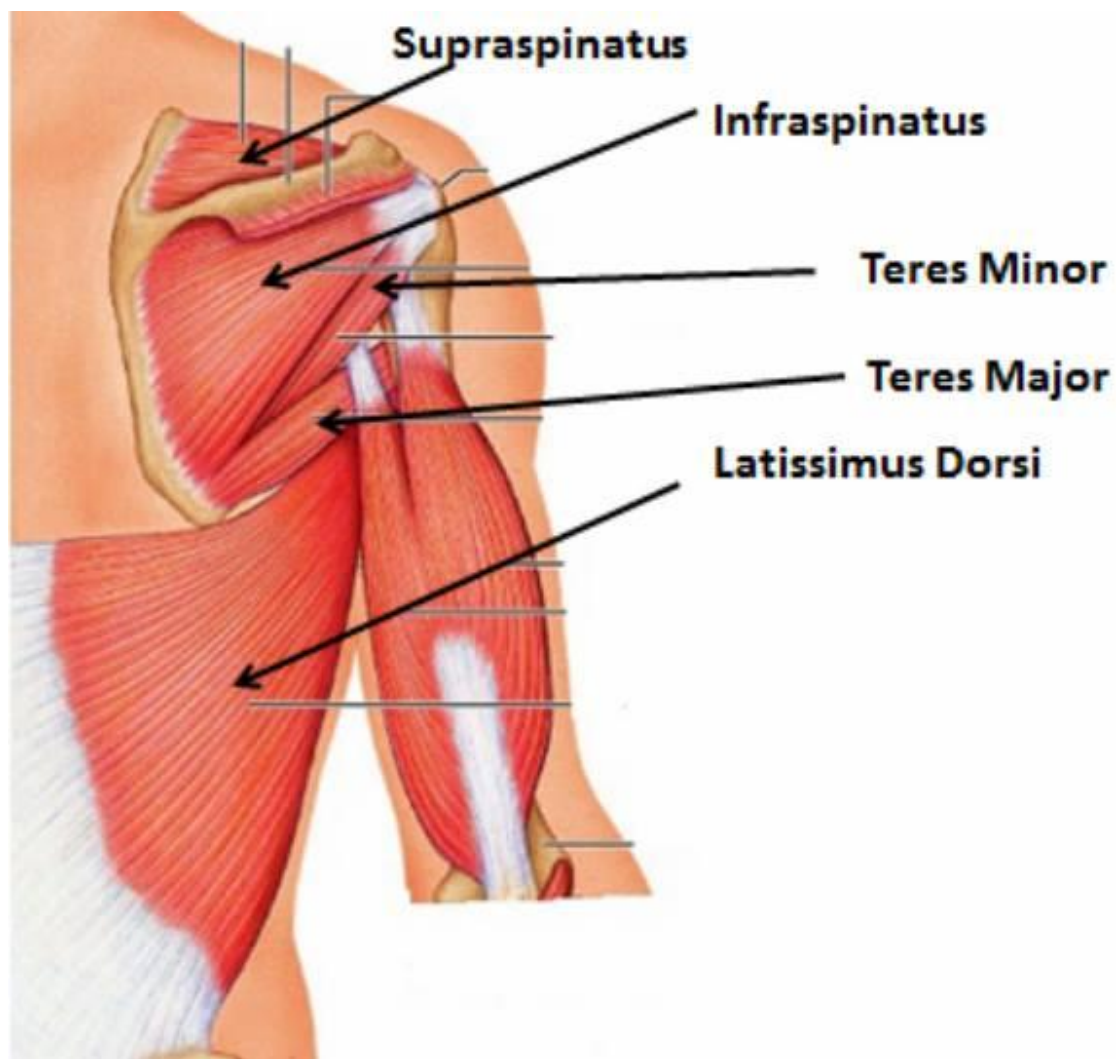
-----

-Infraspinatus, deltoid (posterior fibres) and teres minor.

-Lateral rotation is important for clearance of the greater tubercle

and its associated tissues as it passes under the coracoacromial arch, as

well as for relaxation of the capsular ligamentous constraints.



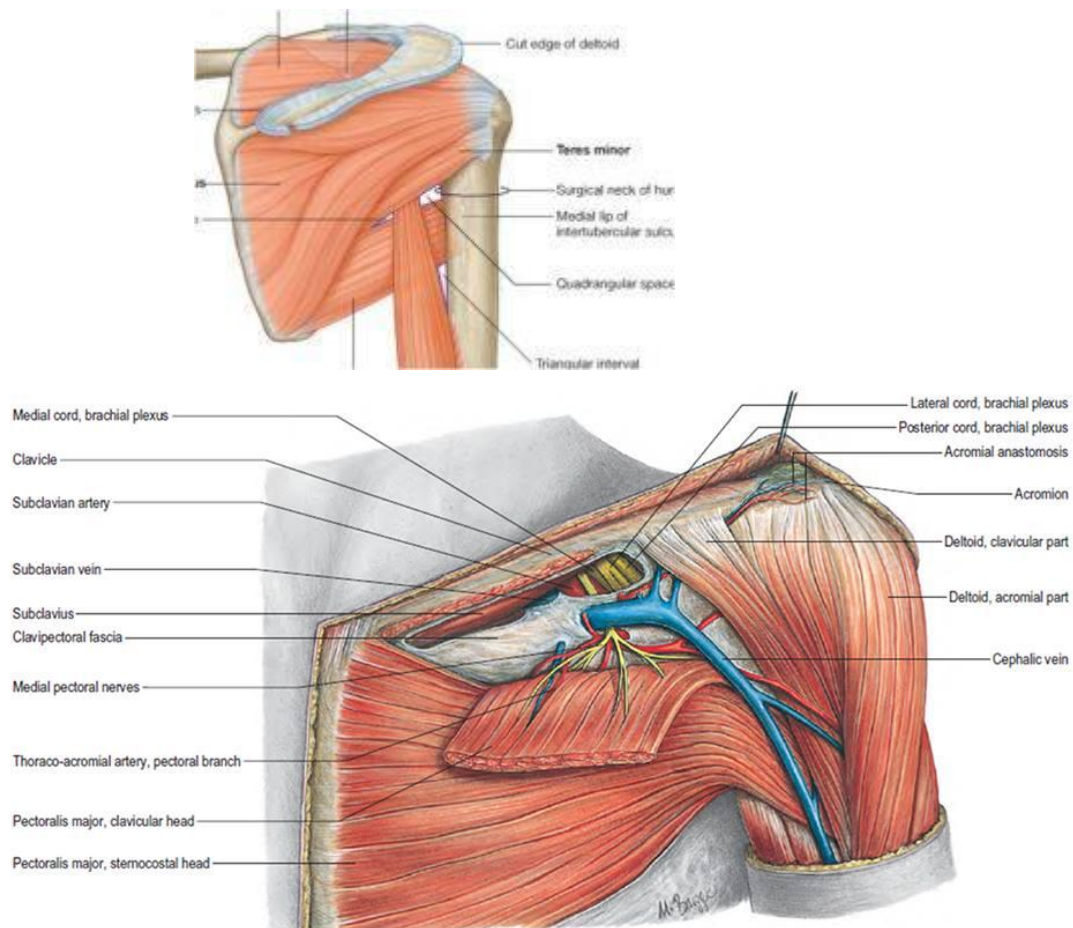


Fig. 46.19 Left deltopectoral groove showing clavipectoral fascia and thoracoacromial axis. (From Sobotta 2006.)

## Anatomy of UL- Shoulder girdle (16)

### 3- GLENOHUMERAL (SHOULDER) JOINT (9)

#### Rotator cuff disease:

-The subacromial space is defined inferiorly by the humeral head, and superiorly by the anterior edge and inferior surface of the anterior third of the acromion, coracoacromial ligament and acromioclavicular joint, forming the coracoacromial arch.

-It is occupied by the supraspinatus tendon, subacromial bursa, tendon of the long head of biceps brachii, and the capsule of the shoulder joint.

-Rotator cuff disease is a painful condition with a multifactorial aetiology in which severe or chronic impingement of the rotator cuff

tendons on the undersurface of the coracacromial arch is often a significant factor.

- The cuff normally impinges against the coracoacromial arch when the humerus is abducted, flexed and internally rotated.

This is

known as the impingement position.

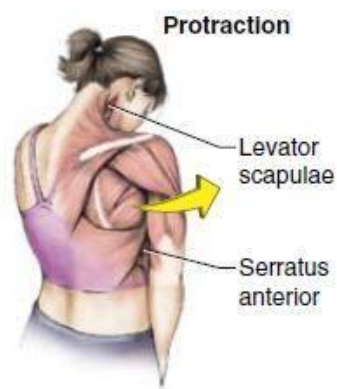
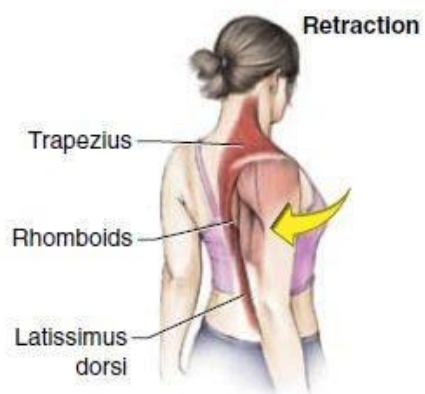
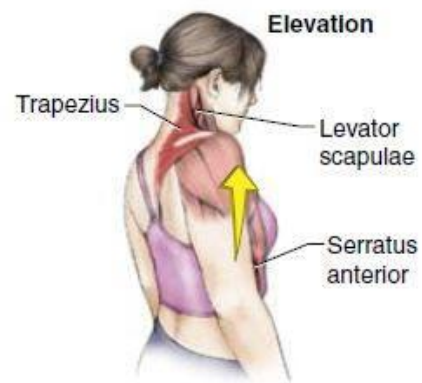
- The supraspinatus tendon is anatomically affected most by the impingement, which interestingly also coincides with an area of reduced vascularity in this tendon.

- Severe impingement can be caused by thickening of the coracoacromial arch, by inflammation of the cuff from disorders such as rheumatoid arthritis, or as a result of prolonged overuse in the impingement position, e.g. in cleaning windows.

- When associated with a tendinopathy from age-related degenerative changes within the tendon, impingement may be associated with partial or complete tears of the cuff.

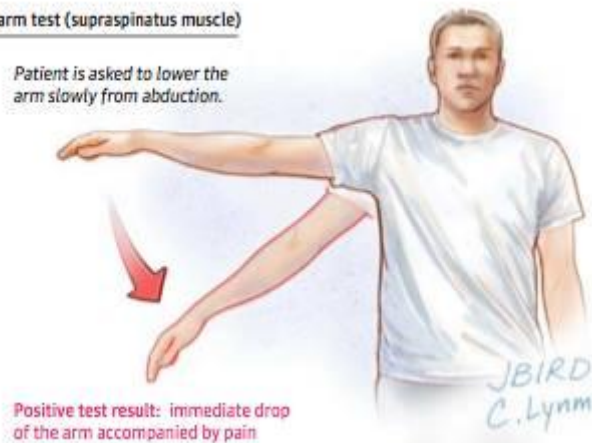
- Clinically, this condition causes tenderness over the anterior portion of the acromion, and pain which typically occurs on abducting the shoulder between 60° and 120° (the painful arc).





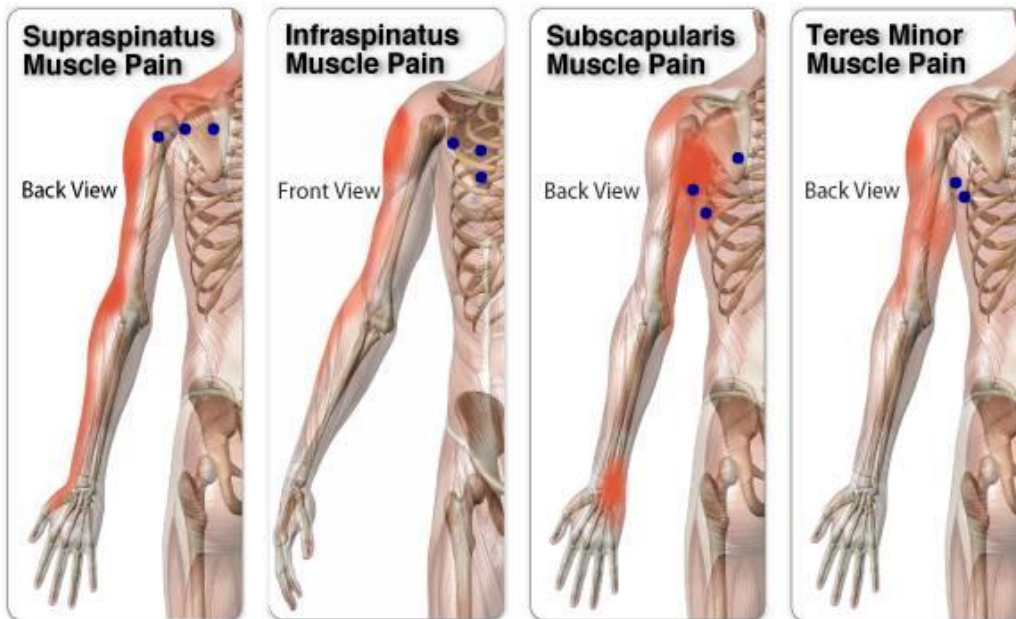
**Drop arm test (supraspinatus muscle)**

*Patient is asked to lower the arm slowly from abduction.*



**Positive test result:** immediate drop of the arm accompanied by pain

## Rotator Cuff Pain Patterns

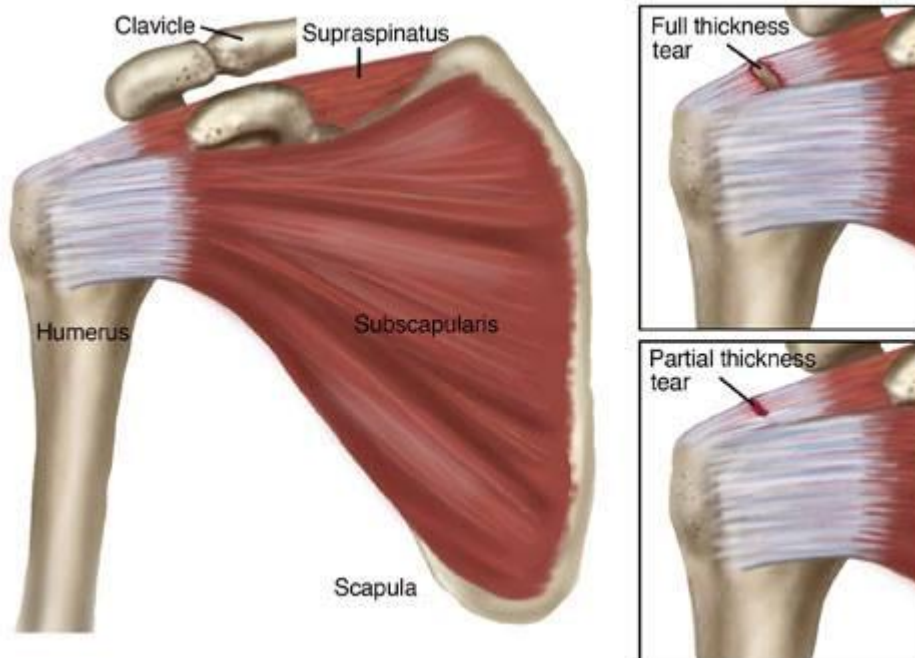


- **Areas of Trigger Point Pain**  
Hypersensitive areas in each Rotator Cuff muscle that are the source of on-going pain and reduced blood flow circulation.

**The Supraspinatus is the most commonly injured Rotator Cuff muscle.**

MendMeShop® © 2013

## Rotator Cuff Tears



Anatomy of UL- Shoulder girdle (17)

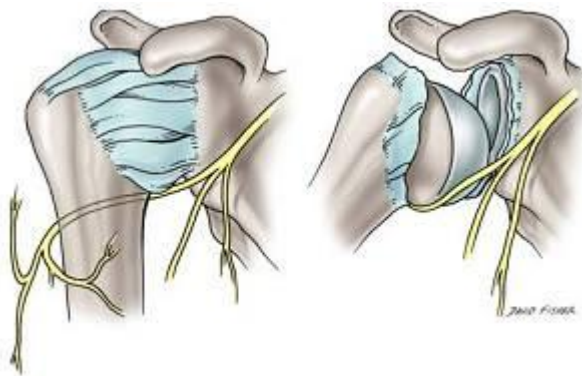
-----  
3- GLENOHUMERAL (SHOULDER) JOINT (10)

=====

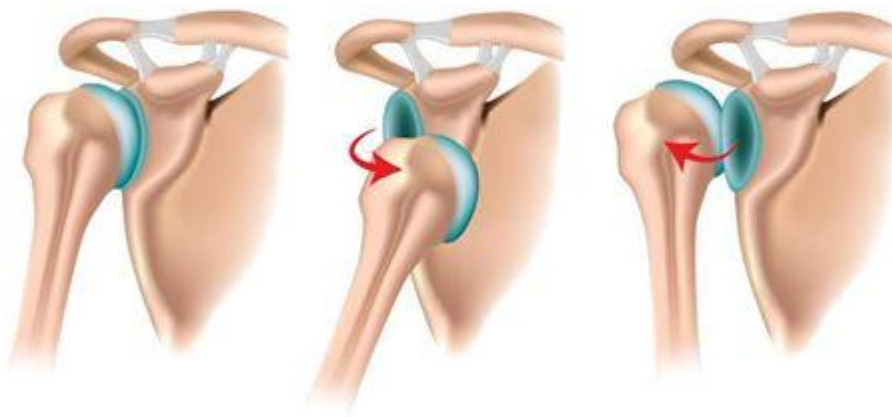
## Glenohumeral joint dislocations

---

- The glenohumeral joint is the most frequently dislocated joint in the body.
- It is most unstable anteroinferiorly, which explains why the vast majority of dislocations are anterior, and occur when the arm is forced backwards when it is in abduction, external rotation and extension.
- Clinically, a dislocated shoulder loses its normal contour, and the acromion process, rather than the greater tubercle, becomes the most lateral bony structure.
- The axillary nerve and artery may be injured during dislocation, and this can lead to inability to abduct the shoulder as a result of paralysis of deltoid together with an area of anaesthesia over the distal part of the muscle (sometimes referred to as the 'badge area' of skin), as well as ischaemic changes in the limb. Posterior dislocation is rare and typically occurs when violent movements produce marked internal rotation and adduction, e.g. in epileptic seizures or electric shock.



## Shoulder Dislocation



Normal  
anatomy

Anterior  
dislocation

Posterior  
dislocation

## Anatomy of UL- Shoulder girdle (18)

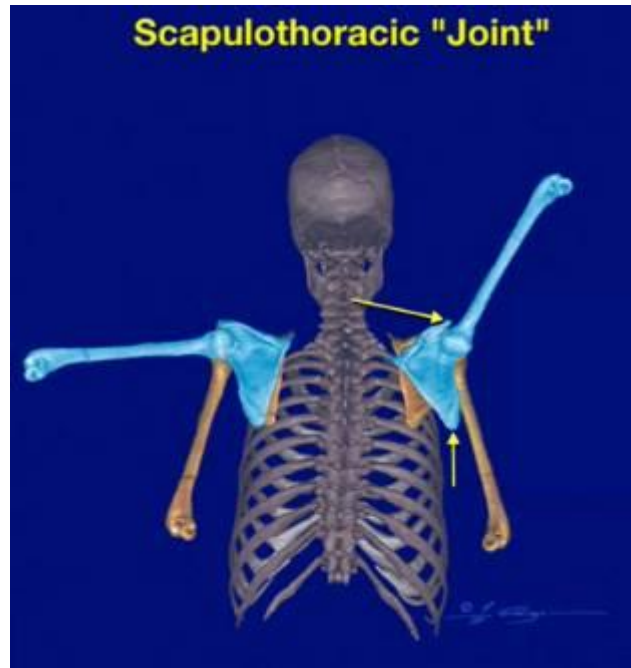
### 4- Scapulocostal joint (also known as the scapulothoracic joint):

-The scapulocostal joint is a physiological joint formed by an articulation of the anterior scapula and the posterior thoracic rib cage.

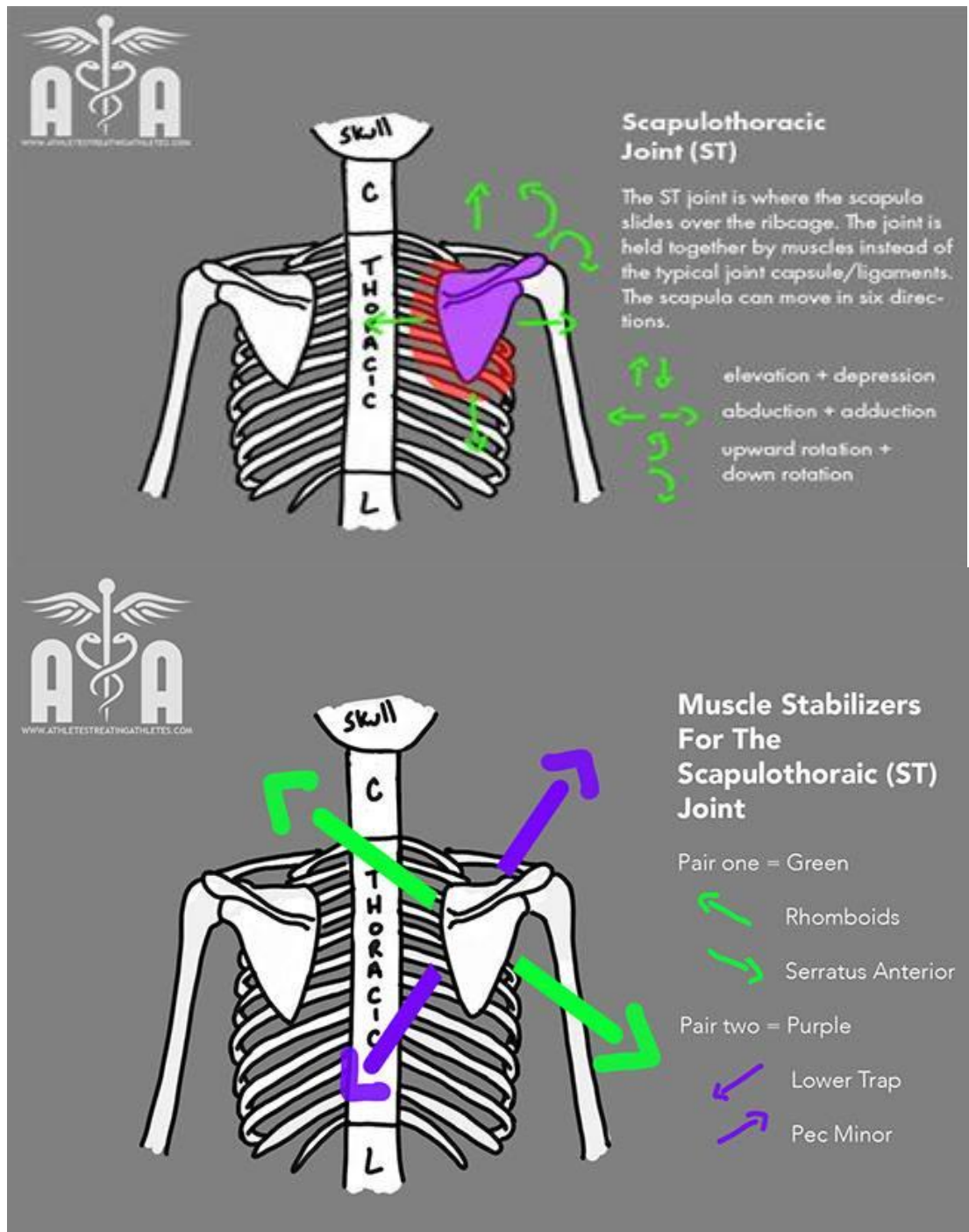
-It is musculotendinous in nature and is formed predominantly by the trapezius, rhomboids and serratus anterior muscles.

-The pectoralis minor also plays a role in its movements.

- The gliding movements at the scapulocostal joint are elevation, depression, retraction, protraction and superior and inferior rotation of the scapula.
- Disorders of the scapulocostal joint are not very common and usually restricted to snapping scapula.







## Anatomy of UL- Shoulder girdle (19)

### 5- Suprahumeral joint (also known as the subacromial joint)

-The suprahumeral joint is a physiological joint formed by an

articulation of the coracoacromial ligament and the head of the humerus.

- It is formed by the gap between the humerus and the acromion process of the scapula.

- This space is filled mostly by the subacromial bursa and the tendon of supraspinatus.

- This joint plays a role during complex movements while the arm is fully flexed at the glenohumeral joint, such as changing a lightbulb, or painting a ceiling.

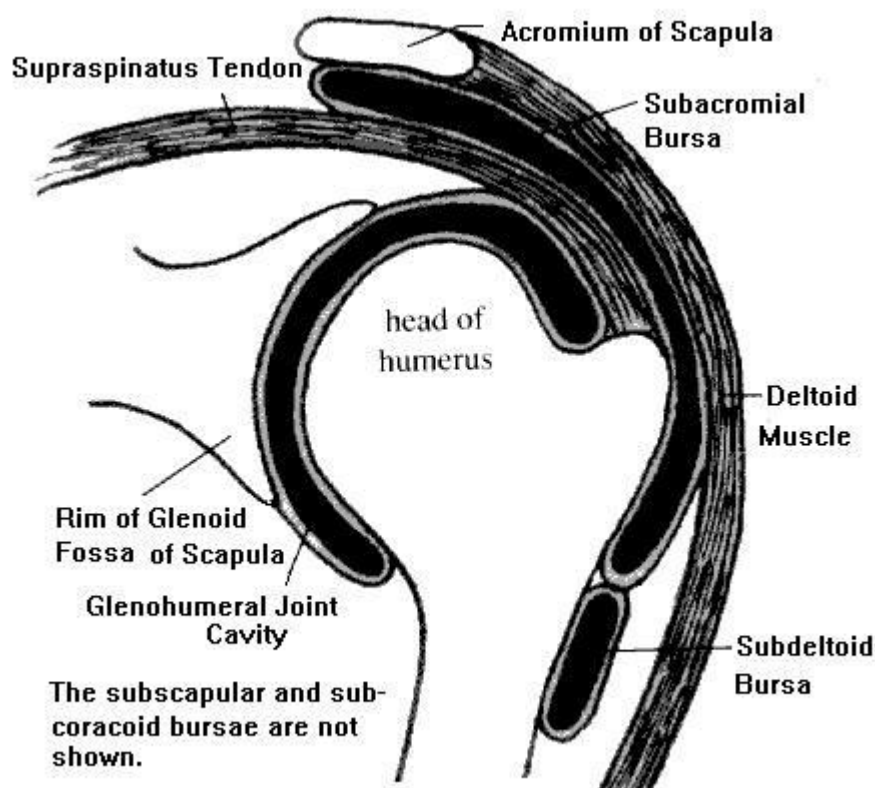
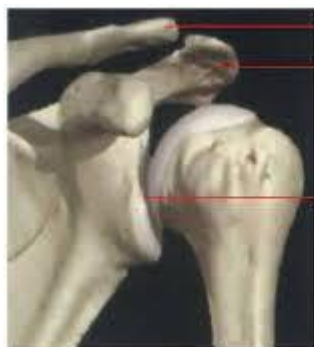


FIG 42: BURSAE OF THE SHOULDER



Acromio-clavicular joint

Subacromial joint space

Gleno-humeral joint



© www.sports-injury-info.com